The Mining Journal.

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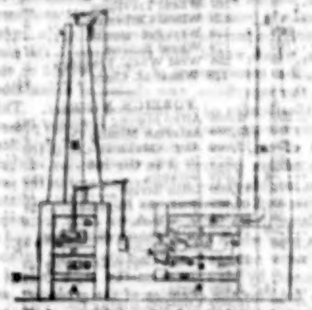
IMPROVEMENTS IN THE MANUFACTURE OF STEEL AND IRON.

The following is the specification of a patent granted to S. Broadmeadow, of Manayunk, Pennsylvania, U.S., *for an improved reverberatory furnace for converting mineral or ore into wrought-iron at the first operation*:—"My improvement in the reverberatory or puddling furnace consists in the so constructing it as that the hearth of the furnace shall be heated both on its under and upper sides. For this purpose, I construct a fire chamber, in which the fuel rests upon grate bars directly under the hearth of the puddling furnace, there being an ash-pit under the said grate bars, such fire chamber and ash-pit being in the ordinary form. The direct heat of the burning fuel which is contained in the fire chamber is, consequently, made to operate on the under side of the hearth, and the heated air and flame ascend through a flue space at the rear end of the fire chamber, then along the puddling compartment to the front of the furnace, and thence back along a flue over the roof thereof leading to the chimney, which is to be elevated in the ordinary manner to create a sufficient draught.

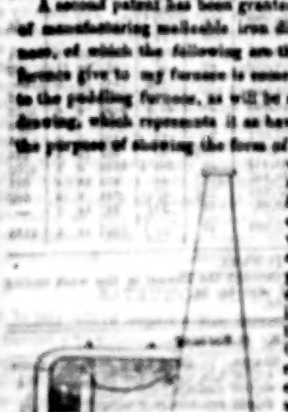
Fig. 1. Fig. 2.



Scale, one-sixteenth of an inch to a foot.

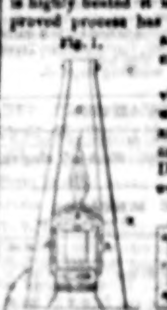
In the accompanying drawing, fig. 1 is a front elevation of the furnace, the masonry which encloses it and the chimney being omitted for the purpose of showing the outline of the interior. Fig. 2 is a vertical section through the middle of the furnace from front to back; A is the ash-pit, B the fire chamber; C the hearth of the puddling furnace D, into which the heated air and flame pass through the flue space E, and operate upon the material within the furnace in the usual manner; F is the roof of said furnace—the hearth and roof should be formed of suitable fire stone; G is a flue above the roof stone, leading to the chimney H; I represents a front door to the puddling furnace, but the main working door is to be made at the side, as seen at I', this being its usual place; J is the door of the fire chamber for supplying fuel; K is a basin at the front of the hearth, and L a tap hole for the removal of slag, &c. As it is desirable to keep the hearth at this part well heated, I sometimes so construct the fire chamber as to allow it to project a foot, more or less, in front of the furnace, by which means this end is effectually accomplished. The lower part of the basin may be strengthened by giving the hearth stone the form shown by the dotted lines *a a*. M is the grate, and N level of the ground.—When this furnace is used for the purpose of converting mineral into wrought-iron directly from the ore, the said ore is to be finely pulverised and thrown upon the hearth, which must be heated to whiteness; in about half an hour the mineral will be fused, and it is then to be treated in the same manner as when puddling pig-iron; by this means the sulphur and other volatile matter contained in the ore will be driven off, and the ore will be subjected to the full action of the heated air. Most kinds of ore may be treated in this way without the addition of any flux, or of carbonaceous matter; but where the ore is refractory, and does not fuse readily, from containing an excess of oxygen, a small portion of charcoal may be added thereto. When the ore is too fusible, owing to its containing an excess of carbon, I add the scales of iron, or some analogous substance, such as the highly oxidized ores, as is sometimes done in the puddling of pig-iron; no rule can be given for this, but the judgment of every competent ironmaster will supply all the information that is necessary. Most commonly, as before remarked, the metal will be brought into nature without any such addition to the iron. When the mineral or pig metal has been thus heated until it approaches the melting point, the fire is to be slackened until it is reduced nearly to a red heat; in this state the ore or the metal is to be worked with a scraper and paddle until the mineral or metal shall have become, as the technical phrase is, sufficiently dry. At this period the heat is to be raised, and when the welding of the mineral or metal commences, it is to be balled into suitable sizes, either for the hammer or the rollers."

A second patent has been granted to the same gentleman, for a process of manufacturing malleable iron directly from the ore in a puddling furnace, of which the following are the details:—"The form that I in preference give to my furnace is somewhat different from that usually given to the puddling furnace, as will be seen by reference to the accompanying drawing, which represents it as having one of its side walls removed, for the purpose of showing the form of the interior. A A is the arch or roof, which, instead of curving down as it approaches the chimney, rises regularly from that part which is above the fire chamber as it approaches the stack, which it may do at an elevation, say of about ten degrees; it may, however, pass horizontally, or even be slightly depressed, without materially interfering with its action; the object of giving to it this form is, to prevent its taking the character of a reverberatory, as the reflecting of the flame and heat so as to cause them to reverberate or impinge upon the ore, converts the large portion of it into slag instead of reducing it into malleable iron. I also elevate the hearth of my furnace at its rear end, and prefer to do this to an extent greater than that of the elevation of the roof; this elevation is shown at D. The object thereof is to contract the throat or opening from the furnace into the flue, so as to make it much less than in the ordinary reverberatory, which is usually about two feet, or two feet six inches; whilst I reduce its height between the door and the roof to about one foot. In the lower part of the chimney, as at *x x*, I place a sliding register or damper, which I can close at pleasure, so as to retain and regulate the heat, such regulation being essential to the success of my process. In a furnace so constructed the mineral and the metal obtained therefrom will be sufficiently heated to produce the intended effect; but the form of the furnace may, as above indicated, be varied to a considerable extent without materially interfering with its use—and there have probably been puddling or other furnaces constructed, which, under due management, might answer the purpose equally well with that described; I do not intend, therefore, to make any claim to the particular form of the furnace which I have described, but only to indicate the main conditions necessary to the success of the process. In my process of reducing the mineral to the metallic state I do not use any of the earthy or other fluxes which are employed in the smelting of iron, nor do I of necessity mix therewith any carbonaceous matter, as has been uniformly done in the attempts heretofore made to manufacture malleable iron directly from the ore. The most notable of these is the process for which letters patent were obtained in England by W. N. Clay, dated March 23, 1841, and published in the *Repertory of Patent Inventions* for that year. In that patent a claim is made to "the mode of manufacturing wrought or malleable iron in reverberatory furnaces from iron ore, by combining therewith 20 per cent., or upwards, of carbonaceous matter." In my process, on the contrary, I employ the ores of iron alone, by mixing together in due proportions such ores as by their chemical composition are calculated to act upon each other when duly heated, and to bring the metal contained in each of them into the malleable state. I take any of the ores which are known as oxides of iron, which I reduce to coarse powder, and with this I mix a due proportion of the ore known as a carburet of iron, also in powder; this mixture I put into my puddling furnace, and, by means of anthracite or other fuel, I subject it to the proper degree of heat for effecting the reduction. The ores so placed in the furnace I do not stir, but leave at rest, until I find that it is brought into a state in which it is prepared for balling, which condition is produced in consequence of the union of the carbon of the carburet with the oxygen of the oxide, and the consequent production of particles of iron in the malleable state. When charcoal or other carbonaceous matter is mixed with the ore which is to be reduced, the carbon will begin to combine with the iron in the oxide which is to be reduced, before the oxygen of said oxide is so far disengaged as to be ready to combine with it, and the metal will become highly charged with carbon, and the whole contents will, consequently, be converted into a fluid mass, and this may occur notwithstanding the utmost care on the part of the operator, a very slight deviation in making the mixture, or in the heat to which it is subjected, converting the materials into slag; but when this mixture consists entirely, or nearly so, of the ores to be reduced, as above described, there may be a considerable variation in the temperature without deteriorating the mass, the carbon of the carburet and the oxygen of the oxide being given out simultaneously, and these, by their affinity, combining with each other, the iron of both the ores will be left in the metallic state, requiring only to be balled up. It will be manifest to any one acquainted with the nature of ores, that in mixing them no proportionate quantities can be designated, as scarcely any two ores will be found to be identical in composition; but the proportionate quantities may be learned from analysis, or will readily be ascertained by experiment in the hands of a competent ironmaster. Although the addition of carbonaceous matter is not necessary in my process of reduction, I do not interdict its use, as it is manifest that a deficient proportion of carburet might find its compensation in such addition; but this would be only a variation of, and not a departure from, the principle upon which I proceed. When the iron is ready for balling the slag is to be removed, and the balling is to be effected in the ordinary way—the working and feeding doors, the tap-hole, and the general appendages of furnaces for this purpose, being such as are well known."



Mr. Broadmeadow has also obtained a third patent for an improvement in the construction of the furnace for converting iron into steel by cementation, and in the process of manufacturing such steel, which is thus described:—"In the ordinary mode of constructing the converting furnace, the bars of iron, after being piled in the coffer or oven, in combination with carbonaceous matter, to the proper height, are covered with a stratum of fire clay and sand, or some analogous substance, which has to be renewed every time the oven is charged. My improvement in the structure consists in the using of a permanent roof of fire stone or fire brick, in place of the temporary covering heretofore employed; I also use a sliding shutter, which is placed in front of the furnace, so that it may be brought down as required for a purpose to be presently made known. My improvement in the manufacturing of the steel, after the process of cementation has been completed, consists in the taking of the bars first from the upper part of the convertory, whilst they are at the highest temperature to which they are to be brought, and subjecting them immediately to the action of tilting or of rolling, without the necessity of re-heating. To do this, a part of the upper layer of bricks which enclose the converting oven is first removed, so as to enable me to draw out the upper bars, and as the bars are successively operated upon the bricks are further removed, until the whole contents of the convertory have been tilted or rolled. As this process goes on, the sliding shutter is brought down so as to enclose the part from which the bricks have been removed. By this procedure several advantages are attained in the process of manufacturing steel. Under that hitherto followed, the whole charge has been allowed to cool down before removing the steel from the convertory, and this necessarily resulted in great loss of time; the bars, after being removed, had to be re-heated, in order to their being tilted or rolled; by this re-heating, time was consumed, and the steel actually injured, it being a well established fact that every time steel is highly heated it is deteriorated. The steel manufactured by my improved process has proved to be very superior to that made from the same iron in the ordinary way; it has in this particular exceeded the anticipated benefit.

Fig. 1.



In the accompanying drawing, fig. 1 is a front view of the converting furnace—the temporary brickwork which is used to enclose the coffer or oven, and likewise those that enclose the flues A A, the arch B, and the chimney stack C, being removed; D is the roof of fire stone or fire clay, which extends over the whole top of the coffer or oven E.

Fig. 2.

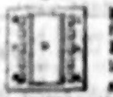


Fig. 2 shows the top of this roof in plan, being a horizontal section of the furnace, in the line X X of figure 1; D is the roof stone, and A A the flues leading from the fire chamber into the arch, as usual."

ON THE PROBABLE AGE AND ORIGIN OF A BED OF PLUMBAGO AND ANTHRACITE, OCCURRING IN MICA SCHIST, NEAR WORCESTER, MASSACHUSETTS.

BY C. LYELL, ESQ., F.G.S., &c.

A bed of plumbago and impure anthracite, described by Professor Hitchcock, in his *Geology of Massachusetts*, is found interstratified with mica schist, near Worcester, forty-five miles due west of Boston. It is about two feet in thickness, and has been worked for coal and lead pencils. It is occasionally iridescent, like coal, and contains pyrites, which is also found in the associated clay slate and garnetiferous mica schist, both of which are impregnated with carbonaceous matter. These schists, including plumbago, are separated from the anthracite occurring on the borders of Rhode Island and Massachusetts, by a district of gneiss and hornblende slate about thirty miles wide. The anthracite of these states is impure and earthy, but has been worked for coal at Wrentham, Cumberland, Mansfield, and other places, where, in the accompanying carbonaceous and pyritiferous shales, are seen numerous impressions of the most common coal plants, such as *Pecopteris plumosa*, *Neuropteris flexuosa*, *Sphenophyllum*, *Calamites*, &c. The shales and grits of these coal measures are very quartziferous, were formerly called greywacke, and have been shown by Prof. Hitchcock and Dr. Jackson to pass into mica schist and other metamorphic rocks, and to be invaded by syenite and trap. Mr. Lyell is of opinion that the stratified rocks containing the plumbago of Worcester, consisted originally of a similar carboniferous formation, but have since been so altered by heat and other causes, as to assume a crystalline and metamorphic texture, by which the grits and shales of the coal have been turned into quartzite, clay slate, and mica schist, and the anthracite into that state of carbon which is called plumbago or graphite. To render this hypothesis more probable, he adverts to the progressive debituminization of the coal of the United States, as we proceed from the horizontal coal measures of the Ohio and the west, to the eastern and more disturbed zone of the Appalachian Mountains, where coal, occupying precisely the same geological position, and exhibiting the same species of fossil plants, assumes the form of anthracite, as has been shown by Prof. H. D. Rogers and others. The Rhode Island anthracite may be considered as representing a further state of change, in which the volatile ingredients of the original coal have been still more completely expelled; and in the plumbago of Worcester we have the last step in the series of transmutation, where all traces of fossil plants and vegetable structure have been obliterated, and where the lithological character of the sedimentary rocks has been entirely altered. It is remarked that the Silurian formations, which are so largely developed in the United States, yield no beds of coal or anthracite which could by metamorphosis be supposed to become turned into such a carbonaceous stratum as that of Worcester. The author concludes, by observing that the difference of strike between the mica schist containing plumbago at Worcester, and the nearest carboniferous rocks of Rhode Island and Massachusetts, affords no argument against the theory of both having belonged originally to the same group of sedimentary strata. In New England and in Nova Scotia, the coal measures frequently deviate widely from the same strike in contiguous districts, and the direction of continuous stratified zones in the Alleghany Mountains, composed throughout of similar Silurian and carboniferous rocks, has been shown by Professors W. B. and H. D. Rogers to vary more than 60° in different portions of that chain.

MINING PROSPECTS IN GERMANY.

GENERAL REMARKS ON THE MINING DISTRICT OF THE VALLEY OF THE KINZIG RIVER, IN BADEN.

The mining district of which this paper gives a general description includes a certain set of the western hills extending from the great chain of the Black Forest towards the Rhine, and comprises, in addition to a great number of lateral vallies of the Kinzig, especially the valley of the river. This valley is divided, with reference to the mines, into the two cantons of Wolfach and Wittichen, and contains nearly twenty German, or ninety-three English, square miles. The main trunk of the chain, against which the mining district leans, is there about 3000 ft. high; the various branches running out from thence in a western direction, rise upwards of 2000 ft. above the level of the sea, and all these mountains are covered with wood pine; the narrow valleys, rich with springs, are clothed with a most luxurious vegetation, and the vine grows where the hills slope down towards the open valley of the Rhine; there are several mineral sources of chalybeate waters, and the most frequented bath is Rippoldsau. For picturesque scenery the district shares thoroughly the beauties belonging generally to the western slope of the Black Forest, and these vallies are, for this reason, greatly frequented by foreigners. Several small towns, for instance Alpirsbach, Schiltach, Wolfach, Hausach, Haslach, &c., are situated in the various valleys; the neighbouring town, of greater extent, is Offenbourgh; the more distant ones Fribourg, Strasbourg, &c.; the distance from Wolfach to Strasbourg is about seven German, or thirty-three English, miles. The great line of the proposed Baden railways will cross the mouth of the Kinzig Valley, which it is also proposed to traverse by a branch line, to be carried across the Black Forest, for the purpose of uniting the valleys of the Neckar, in Wurtemberg, and the Rhine, in Baden. The roads leading from the valley of the Kinzig to that of the Rhine are in the best condition, and facilitate greatly the communication between the mining district and the Rhine, as well as between the Baden high roads and railways, which are carried, or proposed to be carried, from the Lake of Constance to the River Main, parallel with the Rhine through the whole length of the Grand Duchy.

Sovereign Authority.—Only a very small part of the territory, immediately adjacent to the high tract of the western slope of the Black Forest, is placed under the dominion of the Wurtemberg Government, which possesses in one of the lateral valleys of the Kinzig River the town of Alpirsbach; by far the greater part of the mining district belongs to Baden, the Prince of Furstenberg being lord of the manor.

Rocks, Ores, &c.—The rocks surrounding the various ores, consist chiefly of granite and gneiss, the former is frequently employed for building purposes, on account of its beauty, durability, consistency, and size of the blocks; the depth of these rocks is unknown, but they fill the whole body of the mountains, form the principal element of the mining district, and prevail also in the lower part of the Kinzig Valley; on the highest summits of the hills, stratums of red sandstone are found. Both gneiss and granite are very extensively pervaded with veins of barytes, quartz, and calcareous spar, varying from one-half to three and four English feet in thickness, averaging one and a half feet wide, and containing the various lodes of silver, copper, lead, and cobalt; all these ores are rich in metal. Silver is found with antimony, bismuth, and lead, but mostly native in dendroit shape, and in lumps of several ounces up to many pounds. Copper, as copper pyrites and malachite, holding from 30 to 50 per cent. of metal; the latter is of the best quality, soft, and ductile, and equals in goodness the Russian Pashkow copper; it is sold at the rate of 50 florins to 60 florins (equal to 4*l.* or 5*l.* sterling) per cwt. Lead contains from 70 to 75 per cent. of metal. Cobalt—as silver cobalt, earthy, &c.—is found with copper and lead, as well as in separate mines, and is worked into smalt and oxide, at Alpirsbach. A set of samples, showing the richness of these ores, can be seen at Mr. Vignoles's, Civil Engineer and Professor of Engineering, in the University College, London.

The Previous State of the Mines in the Kinzig Valley.—The mines of the Kinzig Valley have been worked from a very remote period, but, from their first existence up to the present time, they have never been worked conformably to the rules of science, in a methodical manner, or with sufficient capital. The working has rather been what is called in Germany (raubbau) robbery—viz., a few individuals joined together, each contributing a very small sum; they then opened the hills on such spots where strokes of ponderous spar or quartz broke through the ground, established some short burrows by a few miners, stopped the works when no immediate profit appeared, or shut up the mines entirely when the produce became less, or seemed to fail. Besides, it seems to have been an ancient custom for single country people to employ their time and money in small mining adventures, employing like persons seeking for hidden treasure—a mode of working which could not, of course, have any positive and satisfactory result, but which, as the most feeble and imperfect trials opened metallic veins, and yielded some profit, kept up in the population of these valleys a predilection and inclination to the working of mines, and induced them repeatedly to renew trials, which, though absurd in themselves, and awkwardly managed for want of capital, and a rational system, still seemed to be justified by the constant appearance of vestiges of noble ores, and because they were often attended with success far beyond their expectations. Thus the hills have everywhere been breached, the ores nearest to the surface taken away, and even the shortest drift been [illegible], and renewed the proof of the importance and great riches of this mining country. There are two circumstances characteristic in old times, as well as at present, of the mode of working these mines, and well worthy the consideration of any company desirous to take an interest in them, and to develope the works on a large scale, and with proper energy—viz.: 1, that all the galleries have hitherto been established on the lofty parts or slopes of the hills; and, 2, that the excavations have not been pursued either to a great horizontal length, or to perpendicular depth. Towards the end of the last century the mines of the Kinzig Valley lost much of their prosperity; the general and principal cause was the troubles occasioned by the war, as the first invasion of the French led them through the Kinzig Valley, and across the adjacent mountain, Kniebis, into the kingdom of Wurtemberg. Some remarks relative to the profit obtained during certain given periods of the last century will not seem to be here out of place. According to the official returns, the produce of the mine of Sophia, from 1758 to 1778, in silver and cobalt, was 103,319 florins, equal to 17,994*l.* sterling; in the month of May, 1769, a block of native silver was found, weighing 2430 lbs., besides a number of other lumps, weighing several pounds, mostly of dendroit shape. The produce of St. Joseph was, from 1720 to 1733, in silver and cobalt, 103,[illegible] florins, equal to 17,[illegible]*l.* sterling. That of St. Wenzell, from 1767 to 1788, 201,796 florins, equal to 33,144*l.* sterling; this mine also furnished several blocks of native silver up to a quintal in weight. It is to be observed, that the works of the mines called Sophia, as well as St. Wenzell, have not been pushed forward for any considerable length of levels, nor have they attained any depth. The produce of Frederick Christian, from 1783 to 1790, was [illegible] florins, [illegible]*l.* in silver and bismuth, rich in consequence of a peculiar kind of silver ore. The Herrensegen, or Lord's Bounty, from 1709 to 1740, was, in cobalt, 32,[illegible] florins, equal to [illegible]*l.* It is to be observed, that few persons were ever employed in these works, and the cost of produce was, consequently, very small.

Present State of the Mines.—Since the general peace, a renewed interest for the Kinzig mines has arisen, but the works are neither supported by machines and engines of any kind, or by any adequate funds, and the general mode of working is not different from that which existed during the last century. There are at this moment three different parties of lessees principally engaged in the mining district of the Kinzig Valley:—

1. The Baden Company, established nine years ago, is said to have a very large nominal capital, but it is uncertain that the actual sum employed in working is very small. The number of workmen which the company employs in the mines of the Kinzig Valley, as miners, pitmen, [illegible], &c., does not exceed thirty, and the mode of working is founded on scarcely better principles than it was in former times. Yet they reap a good profit, and the shares were sold some years ago at 27 per cent. above

par, but the company having also commenced certain mines in the Munster Valley, which are not profitable, absorb the considerable gain obtained in the Kinzig Valley—the shares have now fallen to par. All the functionaries of this company unanimously complain of the want of energy and capital, and there is every appearance—indeed, almost the certainty—that the banker who is at the head of this company considers the whole undertaking in rather an unfavourable light.

2. The Alpirsbach Company, established some years since, has so small a capital, that successful results can scarcely be expected—very few miners being employed in the galleries of the mines worked by this company.

3. The company of Messrs. Georgii and Dortenbach, known as the Calw Company, also works with very insufficient means and few workmen. The capital employed in the mine of St. Michael was repaid last year, and the produce now not only covers the outlay, but yields a profit. In addition to these companies, single mines are always worked by single lessees, or by partners who hire closed works, or open new groves, and work them as time and money permit.

On travelling through the mining districts of Wolfach and Wittichen, I had the opportunity to make the acquaintance of many persons (mining captains, ground bailiffs, &c.) upon whose judgment I can with safety rely, as they have been bred, or naturalised sixty years ago, in this country, and are fully acquainted with all the events and incidents that have happened relative to the mines; they assured me that, according to the experience which they had gained as overseers, &c., in the mines of the other parts of Germany, and of the Continent, there could nowhere be found plainer and more positive signs of rich produce than in the above districts, and they say that this conviction is supported—1st, by the successful results of these imperfect and inadequate trials (for instance, the Herrensegen yielded about 60,000 florins—5000*l.* sterling, from 1820 to 1832, silver, copper, and lead, though worked by no more than five to seven workmen); 2d, by the inconsiderable depth in which precious metals are found, and which is not far from surface; and, 3d, by the richness of the ores considered by themselves.

The same opinion has been laid down by Dr. Kurr, professor at the Polytechnic Institute at Stuttgart, who lived for some time as mineralogist and botanist in Norway and Sweden, and studied also at the mines of the Harz and Kongsberg. But, considering the opinion just expressed, the question may be put—"Why has no greater inclination been shown on the part of German capitalists to invest money in the mines of the Kinzig Valley?" The reasons are simply and plainly as follow:—

1. *The Want of Large Capital.*—Mining speculations are chiefly in favour and activity where superfluous capital exists, which is not absorbed by inland manufactures, agriculture, and commerce. In Germany, however, the interests of agriculture, manufacture, and commerce, made such a claim on the national means, that mining speculations could only originate and prosper in obtaining such minerals as have a direct connection with those branches of national labour—viz., iron and coal. All the German States stand in this latter position; wherever enterprises, in the modern time, originated for the purpose of obtaining the precious metals, the parties have been obliged, more or less, to seek foreign capital. This has been done in Rhenish Bavaria, Nassau, &c., where it is well known English capitalists work quicksilver, copper, silver, &c., mines—which mines, however, I can venture to assert, and without fear of contradiction, are beyond all doubt much inferior to the rich mines of the western Black Forest, especially those of the Kinzig Valley.

2. *The Want of Spirit of Association.*—In fact, this powerful animator of national industry and trade has awoke gradually since the establishment of the German steam navigation and railway conveyance, and it must be confessed that large sums have been and still are embarked in these enterprises; but this circumstance is one of the very reasons which causes speculation in mines to turn more to iron and coal than to the precious metals.

These reasons have hitherto prevented German *capitalists* from appreciating the Kinzig Mines as they ought to be—for amongst professional men there is but one opinion as to their importance and value; and, if no notice or attention has been bestowed on these works by *foreign parties*, the reason may be, because they heard that the working of these mines has never been quite interrupted, and, perhaps, no opportunity presented itself to engage in such enterprise—or, because the various companies in the Kinzig Valley had hitherto no opportunity to seek for foreign capital, or, more likely, neglected doing so, thinking to be able through their own means to obtain great results—and, moreover, feeling contented with the small profit which the working of alternate mines never ceased to yield them. Many sources of public and private wealth still remain neglected in Germany through indolence; striking instances might be mentioned to prove this fact with respect to other public enterprises—a case in point, for instance, are the Nassau Mines, which, though far less productive than those of the Kinzig Valley, were never thought of, until the formation of an English company drew public attention to them. Thus, endeavouring to describe the Kinzig Mines, and to invite foreign parties to a participation in these works, I do not know what influence the opinions I have expressed may exercise with respect to this enterprise; but I think the above statements and arguments will at least prove—

1. That the works in question would have long since been abandoned, were it not that, in spite of all these inadequate trials, the repayment of the outlays, or more or less profit, had been obtained by the different companies and owners, who have for many years been, and still continue to be, engaged in these works.

2. That all circumstances unite to encourage the hope, that a more systematic working would produce better results.

Nearly twenty years ago, a number of monied and professional persons associated for the purpose of forming a great company, which was to work upon a very extensive scale the mines situate in the Baden and Wurtemberg Black Forest, and more especially those of the Kinzig Valley; the name this company proposed to adopt was, the "Mining Company of Southern Germany." By the papers put forth at the time, and stating in general terms what I have now endeavoured to prove of the importance and value of the Kinzig Mines, it appears, that it was intended to obtain the support of the Baden and Wurtemberg Governments—but the latter imposed such onerous terms, that the whole plan was abandoned. Some time after, the French Revolution turned the general run of ideas; then the RAILWAYS began to attract interest and money—and it was but five or six years since that the idea of the "Southern German Mining Company" was renewed by the Baden Company, but on a very reduced scale.

CONDITIONS FOR SUCCESSFULLY WORKING THE KINZIG MINES.—The mines of the Kinzig Valley, since their first establishment up to this day, have never been worked on sound principles, or by means of sufficient capital; these must be united to insure larger and continued profits, and [illegible] what is chiefly to be desired—viz., to get the ores from greater depths, the mines worked being nearly all established on the higher parts of the hills, to drive adits and levels from the valleys, for draining off the water, and get into the ore grounds, which have not been seen from the bottom of the old shafts; these operations will also naturally form trial works to discover new lodes in the mountains, and thus introduce into these mines a scientific system of working. Experience has shown that the mines of Kinzig Valley grow richer and more productive in depth; important trials made in several shallow pits of the St. Wenzell, the Frederic Christian, and the Herrensegen, prove this fact beyond doubt, but these were obliged to be abandoned from the want of means for [illegible] them, and the richest ores yet obtained are given down in the bottoms of these shallow levels. It is, therefore, doubtless, indispensable, in order to insure success, to sink shafts and drive deep levels, which will thus facilitate the works, [illegible] by drainage and giving air, open new lodes, and establish a system of working on a large and profitable scale.

Preliminary Arrangements.—The first necessary step for any company would appear to be, to obtain plans, showing all the mines in the district, with their various shafts, levels, [illegible], &c., pointing out distinctly the run of the lodes, to obtain estimates of the various trials and experiments that have been made, and, upon these facts, to form their judgment, and then decide on which mines to [illegible] the working should commence. A map of the mining district, with reference to the actual [illegible], their course, length, &c., has already been commenced, which only [illegible] to be completed for this purpose. In the next place, it would appear to be advisable to work each of the existing mines at their present depths, so as to [illegible] immediately [illegible] to aid in the expenditure of the more extended workings. A considerable number of mines are free, possession of which might be had at once, others are likely to be soon left by their present owners, the [illegible] of the present working being the want of capital, science, and perseverance, and the [illegible] results show that every [illegible] has reaped the fruits of his predecessor's labours; this may be easily conceived, when it is known that often not more than three or four pitmen are employed in one mine—the works proceed slowly, and the owner losing his patience, or his money, or both, quits the mine, which falls into the hands of others, who reap the benefits, which a little further perseverance would have secured to the former owner. That any company working on positive principles, and with some capital, is almost certain to reap a good profit, is sufficiently proved by the Baden and Calw Companies, and there is no doubt but that far more advantageous results would be obtained, if the undertakings were supported by more ample funds, as well as by the adoption of a more extensive and practical system of mining. Among the great number of mines abandoned, the following may be mentioned:—The St. Wenzell, in the Frohnbach Valley, district of Wolfach; the Alpirsbach Company would doubtless like the assistance of capitalists in working the David, in the Kinzig Valley, in the district of Wittichen, for cobalt and silver—and the Sophia, in the same valley, containing like ores; the Calw Company will offer the Herrensegen, in Wild Schappach Valley, district of Wolfach (argentiferous galena, copper pyrites, and malachite)—and the Michael, ditto, ditto. The Calw Company possess a smelt-house at Alpirsbach; but it would be, perhaps, found more convenient to refine the ores in England, as the conveyance down the Rhine is no difficulty, and water carriage reasonable.

Workmen and Wages.—At first, there will be no want of workmen; new ones may be easily brought up, as the inhabitants of this country continue their old predilection for this business. The miners are known for their probity, frugality, assiduity, and perseverance; they are never searched or surveyed, though they have frequent opportunities of selling valuable specimens of ore to travellers. Part of the work is paid for by the day, other given on contract; miners working on lodes receive 30 or 36 kreuzers (10*d.* or 12*d.*) for twelve hours, from six in the morning until six in the evening, including one hour for dinner; no night labour is performed at present, but the workmen would readily do so. Deads are given to contractors, and the prices per lachter vary from 12 to 100 florins (1*l.* to 8⅓*l.* sterling), in proportion to the difficulty of labour, and according to the hardness of the rock and quantity of water; one lachter is ten Baden feet (3·28 yards English)—the levels are seven feet high and three feet wide, the cubic lachter therefore contains 210 cubic feet of rock. Drifts and shafts, from the nature of the strata, very seldom need casing. There is also no want of overmen, viewers, &c., to begin with; and the salaries required will be very moderate.

Relations to the Baden Government and the Prince of Furstenberg.—Every new opening falls under the jurisdiction of the Baden Government, which, however, will by no means be felt in a troublesome manner; the Baden authorities are remarkable for their liberality towards every kind of national undertaking. Old mines fall under the control of the Prince of Furstenberg, who is ever ready to further by every means in his power any enterprise to be established in his territory, and gives every facility depending on his authority; there is also no doubt but that he would join any undertaking which might be established for properly working the Kinzig Mines. It may be asked, why the Prince does not himself undertake the mines of his territory?—The reason is, he has extensive iron works, in which he has embarked large capital within the last six years, they being more profitable, on account of the increased demand for iron in Germany, and their being situate in a mountainous district, where abundance of wood renders the working economical; he has already laid out 150,000*l.* on these works, and, it is said, objects to divide his means, by working on his own account the Kinzig Mines. Wood can be bought from the vast forests of the Prince at a most reasonable rate, 3 or 4 florins (60*d.* or 80*d.*) per cord—even if it could not be obtained gratis from him, for casing the shafts and levels.—Of the mines near Alpirsbach, in the Wurtemberg territory, nothing can well be said, until the Government of this State, seeing the success of the Baden works, should of itself offer to enter into some arrangements, and agree to renounce the unwise surveillance it is at present accustomed to exercise over mining matters.

Duties to be paid to the Prince of Furstenberg.—Per three months:

For every mine not yet productive	1 fl. = 1s. 8d.
For every mine where the outlay and returns balance each other.	2 fl. = 3s. 4d.
For every mine paying well	4 fl. = 6s. 8d.

Goods of clear profit, 5 per cent.—or 1-20th dues.

Amount of Capital.—To insure the success of the enterprise, the amount of capital ought not to be less than 1,000,000 florins, or 83,333*l.* sterling—[illegible] per cent. of which would suffice for the first working capital.

MODE OF ENGRAVING UPON, OR ORNAMENTING, STEEL AND OTHER METALS, BY MEANS OF ELECTRICITY.

The means which I propose, consists of an application of electricity, which I believe to be new, and shall be happy if it prove to be of practical utility. The manner in which I have succeeded in producing marks or sketches upon plates of steel is as follows:—I united six batteries of the kind invented by Mr. Smee, in each of which the size of the plate of platinised silver was about three square inches. I fixed the plate of steel to be engraved upon at the zinc end of the batteries. Having placed a wire of considerable length, covered with silk, between the plate of steel and the zinc, I took hold of the wire in communication with the platinised silver, and used it as an etching point upon the plate of steel. A bright electric spark, accompanied by a slight attack upon, or bite into the steel, was the result each time the wire came in contact with the plate. The wire, which served as a graver, was made of platina; the part which I took hold of was enclosed in a glass tube, in order to facilitate its being taken hold of and moved more easily, and to protect the hand against the electric shocks to which it would be exposed without this precaution. On using the wire, in communication with the zinc, as an etching point, and attaching a plate of steel to the platinised silver, a totally different effect is produced. With the apparatus thus arranged, the spark resulting from the contact of the wire with the plate of steel, is accompanied by the deposition of a very small portion of the wire itself upon the steel. By employing wires of different materials, such as gold, silver, platina, &c., a variety of ornamental designs may, no doubt, be produced upon surfaces of polished steel. The effects of the electrical influence above described are not confined to steel; a nearly similar result may be obtained by substituting plates of any other metal. It is to be presumed, that by augmenting the quantity and intensity of the electric currents, the effect upon the steel or other metal would be proportionably greater; and it is very probable, that by modifying the process, the application thereof might be advantageously extended.—J. H. [illegible]: *Bulletin de l'Industrie.*

TO SEPARATE MANGANESE FROM ZINC DISSOLVED IN A LIQUID CONTAINING AN EXCESS OF HYDROCHLORATE OF AMMONIA.—M. Otto has proposed the following method for separating manganese from zinc, when they exist together in a solution containing much sal ammoniac. Ammonia is added, and the metals are precipitated by a current of hydrosulphuric acid; if acetic acid be added to the precipitate, the sulphuret of manganese will be dissolved alone.

CALOMEL.—It is known that the medicinal action of calomel is more energetic in proportion as the powder is finer. M. Soubeiran effects this pulverisation by means of a bellows, which drives a current of air through a large glass tube, containing the calomel heated so as to volatilize it. The current of air condenses the vapours, and carries them in the form of a very fine powder into an elongation of the tube connected with a recipient of water. M. [illegible] has shown that when the air is replaced by the vapour of water, a small quantity of corrosive sublimate is formed.

FORMATION OF AMMONIA.—M. [illegible] has shown that a mixture of hydrogen gas and nitric oxide, passed through a tube containing heated peroxide of iron, gives rise to the formation of ammonia; in the space of half an hour he obtained sufficient to saturate an ounce of hydrochloric acid. The oxide of iron exercises simply a catalytic action, and is not reduced so long as there is an excess of hydrogen.

DETERMINATION OF THE COPPER IN A SOLUTION OF A [illegible] SALT.—M. Levol has made an important modification in M. Fuch's method for determining the copper contained in a solution of a [illegible] salt, by the quantity of copper required to reduce it to the state of a protoxide salt. He places the solution of the salt in a vial, adds ammonia until the liquid becomes of a transparent blue, fills up the vial with boiling water, introduces a bright slip of copper, and closes it lightly—when the liquid becomes colourless, the copper is withdrawn, washed, dried, and weighed. The method has the advantage of being applicable to all the salts of copper, even the nitrates.

OBSERVATIONS ON VOLCANIC LANDS OF THE PENINSULA.

Without entering into a minute consideration of the alterations which the crust of our planet has undergone in the different epochs of its existence, which would be quite unexpected in the columns of this periodical, we must only observe, that if we do but slightly examine our planet, we shall find that its rocks are not at present disposed in the same manner as they must have been at the period of their consolidation; some of them present the characteristics of being formed from sediment at the bottom of seas or lakes; others present signs of having once been on its surface in a state of fusion; finally, others, which corresponded with the latter, have been altered by more or less immediate contact with them. Rocks may, therefore, be divided into three grand sections—fused or non-stratified rocks, sedimentary rocks, and changed sedimentary rocks. Let the primitive state of our globe have been what it may at the time of the union of the molecules which compose it, it appears evident that at the end of a certain number of years, at least, the superficies of this globe must have tended to solidify, from the effects of its irradiation, which would cause it to lose much of the caloric, which would maintain them in a state of fluidity, though its interior would still continue in a liquid state. The solid part, by thus taking a new appearance, would diminish in volume, having to exert a certain pressure on the others; this pressure, sometimes united with the dispossessing of gases in the interior, would augment the tension of the inclosed mass, which, breaking the crust, would ascend to the surface, raising in some places the ancient levels, and in others forming considerable mountains. Calm being at length restored by the atmospheric pressure, and the tension of the molten and gaseous mass remaining in equilibrium, the general loss of caloric from the earth would still continue, the density of the solid crust would be increased, and would again exert its pressure on the interior mass, which would find vent through the crevices of the more ancient rocks, the consequence of which would be the re-appearance of fused rocks on the superficies, new chains of mountains, and other new rocks altered by the vicinity of the inflamed masses. This phenomenon has caused an indeterminate number of changes in our planet, and we see still witnesses of its effects, from the continual or periodical eruptions of the volcanoes; the miners observe it in the interior of their excavations, the geologists in the heights of the mountains; and in the present age, one of such observation and of analysis, we still go on explaining, by means of arguments deduced from facts, which we daily see manifested, an infinity of phenomena over which the ancients conflicted, and at last gave such explanations as were not even satisfactory to the authors themselves. M. Elie de Beaumont, by his system on the sublevations of rocks, has opened an immense field for the energies of the geologist, and has given a rational guide for the investigations of the miner. Although the number of eruptions be to the present time undetermined, as we before said—and M. Elie de Beaumont considers them as twelve only—we might still reduce them to five, if we would confine ourselves to the nature of the rocks which have appeared in these eruptions. They are:—1. Eruptions of granites, diorites, syenites, &c.; 2, of porphyries; 3, of trachites; 4, of basalts; 5, of modern lava. It appears that each of them has appeared in some determined epoch of the globe; the first is always met with in removing the rocks anterior to the carboniferous strata; the second is contemporaneous with the carbon; the third is the property of the secondary rocks; the fourth relates to the tertiary; the last belongs to the present epoch. All these eruptions have extended and compounded themselves continually one with another, especially the three last; it also frequently happens that all are found united in the same locality. The soil of our Peninsula is, up to the present time, very little studied geognostically; but, notwithstanding, we can present a number of facts which will serve as a basis to those detailed and grand undertakings which are still wanting. Those lands which can properly be called volcanic lands, and of the three last eruptions, are met with in Spain on a very extensive scale, and we have nothing to envy the other nations of Europe for in this particular. El Cabo de Gata and La Sierra Alhamilla, province of Almeria, offer upwards of twenty-two square leagues of trachites, which accidentally have in their mass granites, oolites, and sulphuretted and carbonated veins of lead and copper; in the plain of Mazarron (Murcia), also trachitic, there are others intersected with argentiferous galena of from 4 oz. to 5 oz. of silver to the quintal of ore. The rocks are frequently composed of prisms or columns of from three to eight sides; in the Morron de los Genoveses, the type of this basaltic formation may be seen, as well as the columnar, pumice, pitches, obsidians, &c., all united in a hill of from 80 to 100 varas in altitude, in which a crater is clearly seen, and in the middle eminence, at 1000 varas in distance, we meet with tertiary shells, enveloped in the ashes and fused mass emitted from the volcanoes. There is a volcano well known, and worthy of research, at one league from Vera, in the above province, a hill which they call de la Virgen de la Cabeza, the lavas of which have covered a space of two square leagues, producing rare phenomena amongst the rocks with which they came into contact. The vicinity of Olot, in the province of Gerona, is also formed of basalts and modern lavas, occupying a space of more than twenty square leagues; the volcanoes of Montsacopa, Montolivet, Santa Margarita, &c., are noted for their state of preservation; and the basaltic colonnade of Castellfollit is as picturesque and surprising as the Giant's Causeway and other parts of the Hebrides. The last eruption in Catalonia which history records was in 1421; prior to which for several years, according to the Padre Mariana, the earth rumbled all the way from Tortosa to Perpignan. In the northern side of the Sierra Morena, in the province of Ciudad Real, there exists now a volcanic soil of many square leagues, between Argamasilla de Calatrava, and the site anciently occupied by the city of Alarcos. There may be other volcanic lands in the Peninsula, but the above are the most remarkable.—*Translated from the Boletin Official de Minas.*

ON THE SALT-PITS OF ROQUETAS.

The salt-pits of Roquetas are situated half a league to the east of th[illegible] town of this name, in the province of Almeria, and consist of a deposit [illegible] salitrous clay and gypsum, in many parts covered by a conglomeration [illegible] limestones, &c., which extend almost over the adjoining plain. This cal[illegible]reous conglomeration is not of much thickness, and is composed of fragm[illegible] of various rocks, principally limestones, united by a kind of cement th[illegible] very abundant, and containing a great quantity of marine shells. The [illegible] litrous clay contains much of the oxide of iron, which communicates [illegible] it a strong red tint, and the salt is there found to a considerable exte[illegible] The gypsum which covers it in some places is generally a mass formed [illegible] small crystals of diverse formation. These salt pits are nothing more th[illegible] a natural lake of about 1500 varas in diameter, in which the rains dep[illegible] themselves during the winter, which dissolve part of the salt contained [illegible] the clay forming the bottom, and causes it again to deposit itself upo[illegible] in crystals in the spring, when the lake is dried up from the effect of [illegible] heat of the atmosphere evaporating the water. The lake is divided by [illegible] into four portions, by means of dykes of earth, and the rest of the la[illegible] is almost left to Nature; from this neglect, the annual produce has fal[illegible] from 50,000 *fanegas* per annum to hardly 30,000, and the article is m[illegible] more inferior by the mixture of earth and other impurities. By tak[illegible] precautions to limit the influx of sand and the rubbish brought down [illegible] the waters, so as to preserve more pure the salt, these mines might [illegible] rendered extremely profitable. But we think, notwithstanding, that n[illegible] ther this establishment, nor the others which Spain possesses, will [illegible] realise the grand results of which they are susceptible, until their direc[illegible] is placed under a board of mining engineers, as in the case in France [illegible] other nations.—*Boletin Official de Minas.*

NEW SULPHUR ACID.—MM. Fordos and Gelis have discovered a [illegible] sulphur acid, which has a singular composition. When to two equival[illegible] of hyposulphite of soda (Na [illegible]) one equivalent of iodine is added, [illegible] iodine dissolves and affords a limpid and neutral solution, containing [illegible] iodide sodium and 1 at. of a salt formed of 1 at. of soda, 4 ats. of sulp[illegible] and 5 ats. of oxygen. The two atoms of hyposulphurous acid [illegible] in this re-action, with the oxygen liberated by the iodine, forming a [illegible] compound of 4 ats. sulphur and 5 ats. oxygen. They have called this [illegible] hyposulphuric bisulphuretted.

TESTING OF SULPHURIC ACID.—It has been shown by Baron W[illegible] and by M. Vogel, that air or gas passed over sulphuric acid to be d[illegible] always contains a small portion of this acid. M. Vogel placed und[illegible] bell glass some concentrated sulphuric acid, with a plate containing [illegible] chloride of barium; they were left together for ten days, and upon [illegible] solving away the chloride, he obtained a residue of sulphate of ba[illegible] weighing 1·013 grains.

SUPPLY OF PURE WATER TO THE METROPOLIS AND ITS SUBURBS—PROPOSED NEW COMPANY.—No. III.

We have endeavoured to gain information from various sources respecting the state and purity of the Thames water, and its fitness for domestic use, and from such inquiries it appears proved to us that the impurity of the water is extremely bad, foul, and dirty. As it comes in from the company's pipes, this is apparent, for, upon looking at it in a glass, you will discern a great deal of suspended impurities floating in the water, and it requires some hours before a subsidence of those impurities take place, and the accumulation of deleterious impurities occurs to a dangerous extent—in short, it is a concentration of unwholesome qualities. As an example, we may mention, that in the space of a few weeks, the bottom of cisterns is covered with mud, so as to require washing out, before the water will pass freely. The quantity of mud found in the tanks on an average is two to three inches in every six months, and the water, after standing a day or two in the butt in hot weather, a great many animalculæ and red insects like shrimps are perceptible; and washing women have found the water very impure, and could not use it; the clothes that were washed in it were tinged, and made of a bad colour; in fact, it is well known that the Thames water has suffered a gradual deterioration within the last quarter of a century. "This opinion is founded upon the ascertained fact of the disappearance of fish from those parts of the river, to such an extent as to have led to the almost entire destruction of the fishermen's trade, and upon the circumstances that the eels imported from Holland can now with great difficulty be kept alive in those parts of the Thames where they were formerly preserved in perfect health, and it is well known that the fishmongers in London find it impossible to preserve live fish for any length of time in water taken from the Thames."* The eels are imported from Friesland, in Holland, and formerly the vessels used to come up at once to Billingsgate, but now they are obliged to wait some time down the river before they can come up, for the eels to get inured to the water; at one time they would live a long while in the river which runs through the wells where the eels are kept, and it is an attested fact that when the wells are opened at Billingsgate, there is quite a stench arises, and it is like oil on the top of the water; and ships have been known to lose a cargo of eels in one night, averaging from 1200 lbs. to 1400 lbs. weight, when the hatches are opened in the river, from gas water passing the vessel, which shows itself like scum shining on the water. The fishermen used to catch fish in the Thames, but owing to the bad water the fish died, and the men sold their boats, and have for many years been compelled to buy eels at the market to sell again; this business was carried on entirely by poor people, and a great many persons were employed in the eel trade, and entirely depended upon it for support. Mr. John Goldham, yeoman of Billingsgate-market, whose business it is to ascertain the quality of the fish, to seize and condemn that which is bad, stated in his evidence on the state of the Thames—"That twenty-five years ago there were 400 fishermen, each having a boat and a boy, fishing above and below London-bridge, from about Deptford to Richmond, and the fish they caught were roach, plaice, smelts, flounders, salmon, shads, eels, gudgeon, dace, dabs, &c., and they gained their livelihood entirely by fishing in the river; I have known them to take ten salmon, and as many as 3000 smelts at one haul, up towards Wandsworth, and as many as 50,000 smelts have been brought daily to Billingsgate, and as many as 3000 salmon have been brought to Billingsgate-market in the season, caught in the river Thames. The quantities did not begin to fall off till fifteen years ago, and every year since that period there has been a diminution in the quantity; and now there are not 200 men engaged in the fishery, and many of them are now selling off their nets and boats; last week one man caught only twenty-six smelts, and I have not seen salmon for these ten years, except a straggling fish now and then caught high up or low down the river. I attribute the cause of the loss of the fishery to the great number of the drains which run into the common sewers, as well as the privies and water-closets; formerly the scavengers used to carry away the soil at night, but that practice has of late years been much diminished; the filth that they used to carry away is passed by the drainage into the sewers. In the river at Billingsgate we have many Dutch boats with eels; I have been on board and have seen 4000 alive in the wells, and the next morning three-fourths have been dead, and the same proportion of loss has been sustained by all the Dutch vessels." It is a matter of fact, therefore, that the increase of manufactories within the last ten years, and the accumulation of filth brought down by the rains in dry weather stirring up the filth of the Thames, and keeping it in a state of almost continued agitation, must greatly tend to injure the water, and it is proved that many fishermen have been ruined by the change in the water. Another instance, the gas liquor is let out in the middle of the night, the river is often covered with it, having the appearance of an oily substance, in patches of four or six feet square. The tide ebbs seven hours, and goes about three miles per hour, and this will carry it on this side of Gravesend, and as the tide flows five hours, this substance returns with the tide; in proof of the impurity of the water in the Thames, the flounders which are brought up from sea-reach, Medway, &c., when they get to Woolwich, fly about in the wells of the boats, through which the water flows, and they turn up and die; and now they are taken out of the wells about Woolwich and put on the decks, then into baskets, and brought up dry to London.

The statements which have been made respecting the insalubrity of the Thames water as supplied by the several water companies, were minutely considered by Parliament, and cases have been brought before them of disorders imputed to this cause, such as to warrant us to draw general conclusions, and we think the subject is by no means undeserving of attention. It cannot be denied that the continued use of a noxious ingredient in diet may create predisposition to disease, and of which the immediate operation must be extremely insidious and difficult to trace, and the most eminent professional men have given it as their opinion that the Thames water is unfit for the breakfast table, nor fit to be used in the making of bread puddings, broths, soups, and in boiling meat and vegetables, and the use of such water had a direct and positive tendency to engender those diseases to which the inhabitants of so densely peopled a city are especially liable; it may not be generally known that the mortality on the south side of the Thames is greater in proportion than in any other part of the metropolis, this is traced to the foul and polluted source of the Thames; and medical men have stated also, that persons affected with pain after taking breakfast and tea, is attributed to the water, and bowel complaints also are traced to the injurious effects from the use of Thames water. It has been uniformly the case, after repeated trials, that water obtained from springs or from a pure and salubrious river, complaints have subsided, and the fact is well known that diseases distinctly increase after using the Thames water. With the view that the public may acquire a knowledge of the salutary properties of this great element of life, to make them alive to the dangerous qualities resulting from the use of water loaded with all sorts of impurities, we introduce some authorities to show that our opinions are not lightly formed, but based upon those of wise and eminent men.

Dr. Hume.—"I have no hesitation in saying that the water of the river Thames is loaded with mud and all sorts of impurities, that I have never been able to use it for any purpose whatever, except that of ablution, and even for washing it has been almost always in winter so foul and dirty, and in the dry hot weather of summer so filled with animalculæ that it has been necessary to filter or boil it before it could be used without disgust."

Dr. Hooper.—"I have been aware of the very impure nature of the water supplied from the Thames. It was not only filthy in appearance, but occasionally it had an unwholesome smell. Scarcely a week passes that I am not presented with a leech, a shrimp-like skipping insect, near half an inch in length, a small and delicate worm, which I believe is the *Lumbricus fluviatilis*, or some other animalcule, and the water is usually spoiled, muddy, or otherwise impure."

Dr. Paris.—"As a physician I have devoted much attention to the subject, and am of opinion that the Thames water is injurious to health, and cannot find terms sufficiently expressive of the awful effects it may be likely to produce upon the health, and even lives, of the inhabitants of the metropolis. I visited a family who were all ill, and I believe their illness arose from drinking the water—they changed the water, and got well."

Dr. Kerrison.—"I am of opinion, that the water obtained from the Thames about London is unwholesome; it will not be easy to state any particular form of disease brought on by it, further than the fact that water loaded with a kind of impurity of animal and vegetable matters, in a state of suspension and solution, leads to diseases of the viscera, enlargement of liver, dyspeptic complaints, disturbances, and indigestion. I believe a general insalubrity must exist in the Thames water, and more or less communicate itself to all individuals who partake of it as their general beverage, and for the preparation of their daily food."

"We sneer at the delicacy of the Hindoo, who slakes his thirst at the same tank where his neighbour is sacrificing to Chunda, but what shall we say to the delicate citizens of London who fill their tanks and stomachs with water from the Thames at that very spot into which 100,000 closets, containing every species of filth, and all unmentionable things are daily disgorging their hideous and abominable contents. It is absolutely astonishing that in these days of refinement, and in a metropolis whose inhabitants pride themselves on delicacy and cleanliness, a practice should obtain, at which posterity will shudder, if they can credit it. We do not believe that a parallel instance of bestial dirtiness can be cited from any part of the globe. A time must come when the people of London will open their eyes to this scene of corruption, veiled and concealed as it is by iron tubes and and stone pavements. We are not among the idolaters of the ancients, but we do admire the delicacy of their taste in expending so much labour and wealth in commanding abundant supplies of pure and salubrious water for the everlasting city. It is difficult to say how far the health may be affected by drinking from such a polluted source; but surely such deleterious substances, however minutely divided, cannot be salubrious. It is, therefore, probable that part of the insalubrity of the city, as compared with the country, may be owing to this cause."†

Dr. Wilson Philip, the author of the *Treatise on Indigestion*, declared that its impurities were so evident to the sight, that to certify that it was "unfit for culinary and domestic purposes," was altogether unnecessary.

Mr. Abernethy, Dr. William Lambe, Mr. Thomas, Sir B. Brodie, Dr. Yeates, Mr. Keate, Sir Henry Halford, Dr. Turner, Dr. Macmichael, and Dr. Robert Bree have all attested to the fact, and placed their opinions on record, that the water of the Thames is loaded with noxious matter, much of which is obvious to the eye, and much, no doubt, contained in solution, and that the daily use of such an article of diet must be unwholesome, and have a tendency to produce, or is a cause of, many diseases, and it is a question of much importance, whether such matters in the stomach do not greatly contribute to the production of that faulty digestion and impurity of blood, of which the inhabitants of this metropolis are constantly complaining. It is obvious, then, that salubrious water is of the first importance to health, and we have no hesitation in submitting our opinion, on the authority of men eminent in medicine and science, that a train of evils are the consequence of the use of water loaded with filth and decomposed vegetable matter, and so far impure and unwholesome as to render every meal injurious to thousands, and the comparative unwholesomeness of water for domestic purposes that is daily gorged with the refuse and sewers of London, thereby becoming hourly more extensively deleterious to the inhabitants of this metropolis, is a fit subject to be submitted for the decision of the Royal College of Physicians.

We have some observations to make on the analyzation of the Thames water, showing that it is permanently impregnated from extraneous matter held in solution, and also as regards the method of clarification by the system of subsidence and filtration, proving that it is ineffectual to restore the filthy and unsound fluid to a healthful condition. These questions will illustrate the case of our fourth allegation: but on which we shall defer our remarks to another Number of the *Mining Journal*.

ORIGINAL CORRESPONDENCE.

THE DISCOVERY OF GOLD AND SILVER IN NORTH WALES.

Sir,—I observe in the last *Mining Journal* that you state Mr. A. Dean to have recently discovered the existence of a complete series of gold veins in the lower Silurian formation of North Wales. Now, Mr. Editor, the purpose of this letter is not with the intention of denying the existence of the gold and silver veins in this country (of which there are abundance), but to inform you and the public, that *I* have the right of claiming the discovery of the precious metal in North Wales. "*Facts are stubborn things*," and these can be advanced to support my position. In the year 1836, when engaged in mining, I had samples of ore assayed, and which proved to be very rich in gold and silver; but, not being aware that the working of such ores would be allowed in Wales, I left off further search, until the year 1843, at which time I purposed giving you the result of my labours, but, from press of other matters, unfortunately, as it now turns out, was prevented. Mr. Dean, I believe, has now been engaged in mining operations in this country about twelve months; on his first appearance here, I certainly *informed him* of the existence of the precious metals in this country, and which, apparently, much astonished and delighted him; since that period, however, he, having been engaged in working some mines in this neighbourhood, I expect has cut into one of the veins and found gold, and now starts up, to my great surprise, and claims the right of being the first discoverer of gold in this country. How far he is entitled to that distinction, I must leave to you, Mr. Editor, and the public, to decide, after reading this letter.

ROBERT ROBERTS.

Dolgelley, North Wales, Oct. 27.

NEW APPLICATION OF THE STEAM WHISTLE.

Sir,—I observe in your paper of Saturday last a paragraph headed "Important Application of the Steam Whistle," for preventing accidents to steam-boilers, and now in use in one of the principal manufactories in Leeds. The manner in which you describe the action of the whistle makes it appear a very simple and efficacious plan, were it feasible; but I must confess that I cannot see any possibility of its being so. In the description, the whistle is stated to be placed on the boiler, having a pipe inserted a certain depth in the water, so that when the water leaves the end of the pipe, the steam rushes into the whistle and creates an alarm; now the difficulty is to prevent the water, under a pressure of steam, from rushing into the whistle, and so keeping up a continued noise. Every scientific and practical man knows, that water under pressure will act in a similar manner to steam, except there be a column of sufficient height to counteract the pressure—viz., an elevation of two feet for every pound pressure, and to obtain this column is in many cases impracticable. If a column of water is used, then the plan dates from the time of Boulton and Watt, and is applicable only to some low pressure boilers, certainly not at all to high pressure, as these would require a column of from 50 to 120 feet high. Any other information you may be able to afford on this subject will be most gratefully received by, Sir, Yours, &c.,

THOMAS LIDDELL, Engineer.

Pilgrim street, Newcastle-on-Tyne, Oct. 28.

THE GREAT DESTRUCTION OF HUMAN LIFE IN THE MINES—MINERS' COUNSEL.

Sir,—You have announced in the *Journal*, that the late appalling catastrophes in the coal mines have aroused the slumbering feelings of humanity in the breasts of those who have the power to afford to the immured, unseen, and forgotten working miners, some protection at least; and that, probably owing to a sense of the responsibility they are under, we may confidently anticipate, early in the next session of Parliament, the introduction of some remedial or protective measure. This is welcome, cheering news; it is hard to think that the mineral which affords us one of the very first comforts of civilised, and indeed of general, life, is procured only by the constant sacrifice of the lives of the workmen. It appears that on an average the lives of several men are each day cruelly sacrificed in the bowels of the earth, not so much in order to procure the commodity coal, as owing to the present imperfect system, or rather non-system, of procuring it; a sort of system, if it must be called one, which depends on rude deputy-[illegible]—overmen, such as they are, paid by the masters—and who cannot protect the men without touching their master's purse, either positively, by calling for better machinery, &c., or negatively, by suspending the work of the mine, while the costly work of the pumping-engines must be continued, though it produce them no return.

It is a question what the remedial measure will be which Parliament may recommend? I think a very probable conjecture may be formed of its nature, for we know that inspectors are quite in vogue with the legislature; and inspectors are good in their place. For remedial purposes it is to be hoped, they will answer very well, but I fear their efficiency may be doubted for corrective purposes. Then, if hard-working educated men—men who are not above the every-day discharge of their very responsible duties—are appointed, we may hope the present fearful casualties will diminish at least 50 per cent.; but, in case of a destructive explosion, I think we should be looking for rather more, say much more, than we usually meet with in life, if we expected these inspectors to discharge their duties with the old Roman sternness; that is, to shut their ears to the private representations and representatives of the primarily culpable, and these sometimes their personal acquaintances, among whom they will associate, and with whom many of their most friendly and convivial hours will be spent, in order to exert their strict and fully active interposition in behalf of the poor victims, and in support of the dreadfully lacerated feelings of their widows and orphans. And pray observe, Sir, that the masters in such a case, might think themselves quite honest in their representations—for we must remember that *self*, when exposed to risk or censure, will throw dust into the eyes of the best of us—and also that the judgment of the inspectors, under such circumstances, would be too liable to be biassed by feelings of kindness and social friendship for the masters. But if inspectors, who wish to discharge their duties honestly, might be so biassed, what would be the case if there happened to be a dishonest inspector; I mean one who had winked at evident negligence in the management of the mines in his district, or who had neglected duly to inspect them personally. The dishonest man would certainly lean to the masters and against the men, to any extent, to hush up inquiry and save himself.

I hope, then, Government will employ inspectors, *but not stop there*. In case of any of these direful casualties, other parties should be called in; and I would here humbly recommend the appointment of *miners' counsel*; these counsel to be appointed by the judges on circuit, and, to insure their vigilance, to be removable at pleasure—the instruction to the judges being, that they should appoint counsel living within easy reach of each mining district—say within forty or sixty miles per railway—but not residing in it, nor with any of their immediate connections engaged in the coal trade. It is evident the proper counsel would have to be summoned immediately by the coroner, in case of any accident, and should possess a legal right to appear at the inquest, to call evidence, and generally to represent the cause *of the dead*, and to claim justice for their living relations. The men would *speak out*, when, as usual, first privately examined for the purposes of the inquest, by these gentlemen; but to make a show of inviting them to speak out, one by one, when surrounded by the masters, or their representatives, at the inquest, unlettered and *unsupported* as they are, and with their future means of subsistence entirely in their master's power, is *a farce*—under the circumstances, a most cruel, and let me add, degrading farce. If they are to speak out at all; that is, if they are to speak the open truth, instead of masking it, even at their own personal peril, a rallying point must, and *ought*, to be afforded them, and some prospect of work elsewhere should be held out to them, if afterwards turned adrift, with their wives and children, from the pit now supposed in question. Such alternative an active counsel, who felt that the zealous discharge of his duty was his interest as well as his highest qualification, would to a considerable extent afford them—that is, supposing the masters were dishonest, which the poor fellows, when their all was at stake, would be liable to fear, though they might not be so. At a late awful calamity, one of the few men drawn up alive was asked, when he came to the surface, what was the cause of the accident, and answered, I think most significantly, that some parties knew the state of the pit; but I believe there was no evidence of a similar purport given at the inquest. It was extraordinary also that the owners appeared very anxious to have the men examined individually, and yet extremely averse to their legal agents interfering, who would have represented the body of men *collectively*. I ask is it reasonable, to say the least of it, to propose that each individual (unsupported) poor man should come forward, ostensibly to have the opportunity of giving evidence, most seriously implicating his master, or his representative (supposing he should be in possession of such evidence), while the union poor house, whether justly or not, would most certainly be vividly present before his imagination?

A generous, noble cry of "benevolence to the poor" is spreading over the land; let, then, this be the beginning of the new, and better system; let their protective rights be fully secured to them, and no shameful plea of economy stand between that sound kind of justice, which cannot well be put aside, and mens' lives.—*Oct. 30.*

MECHANIST.

THE HYDRAULIC RAILWAY.

Sir,—Mr. Shuttleworth upholds his favourite scheme with some ingenuity, and much plausibility of argument. In my first letter, animadverting upon one from himself, I condemned the pre-supposed hold he was obtaining on popular opinion in favour of his hydraulic system—such not being the fact, but, even if it were, popular feeling is not of itself evidence of the scientific soundness of a mere theory. As a proof, it is some time since every public journal teemed with graphic illustrations and high-flown descriptions of Henson's flying machine, which, nevertheless, to this hour, proves to be "of the earth earthly," and is just as likely to fly aloft as the hydraulic railway is to carry a single passenger. Mr. Shuttleworth, in replying, commences by charging me with "dogmatism," with "declamatory eloquence," and, by inference, with "deficiency in any mental or other attribute." In short, I am a gross ignorant fellow—of what anxiety remains to be determined; I am one of his "half-hour students, whose presumption prompts them to look over the pages of science, rather than to study them." After this public handling of me, I am assured by Mr. Shuttleworth, in conclusion, that "if I will restrain myself within the usual tone of gentlemanly correspondence," he will be equally gentlemanly on his part—a slight inversion of the golden rule of "doing unto others as we would they should do unto us." But, to be sure, an antagonist, especially an anonymous one, is always a butt for abuse. I do not wonder at your correspondent "B.'s" surmise that I have not read Mr. Shuttleworth's tract, for certainly of all the wordy, incomprehensible productions I ever waded through, it is one of the most unfortunate, making "confusion worse confounded." It is a great pity that some intelligent scientific man was not consulted and engaged to write something, at least, comprehensible. I have not met with any member of the Civil Engineer's Institution who has had, like myself, patience to read it through, and, after reading it, I am nowise enlightened by its perusal, except it be that I have obtained knowledge of another instance of a self-taught man, infatuated with an extraordinary mechanical hobby. Wiser men than Mr. Shuttleworth have had their hobbies, and have ridden them all their lives with about as much pleasure, and certainly all the success that attends seeking for a perpetual motion, or the philosopher's stone. Imagine an horizontal pipe of twelve inches bore, with a slot through its upper side, closed inside by an elastic valve—imagine, further, that at every seventy yards, or more, vertical pipes, 120 feet high, and one foot in diameter, branch from it. Now, for what earthly purpose should we conceive this monstrous apparatus was intended? It might make a splendid fire extinguisher, and, without going to Bath, we might see magnificent jets of water of all dimensions playing away in first-rate style. But the idea of placing passenger and luggage trains on this spouting nondescript would never occur to any hydraulic engineer, and appears to me too absurd to require closer investigation. Either the valve will be closed so tight that Mr. Shuttleworth may defy all motion, and all escape of water—or, otherwise, it will have such abundant play that the carriages will be shot off with a certain amount of velocity, amid the play of myriads of fountains, and a deluge of spray, to the astonishment, if not the delight, of all bystanders. This, then, is one of those untenable schemes which will end in talk, or sink a fortune to prove its utter fallacy; but no mere argument will convince the inventor, who has evidently made up his mind not to be convinced that he is wrong, although philosophers disapprove his plan, and the public are too convinced of the fallacy of his principle to incur the slightest risk by the advance of capital. Not one scientific authority bears testimony to the soundness of his strange theoretical views, neither would any man having the least respect for his scientific character venture to countenance a system which outrages all science and common sense. Mr. Shuttleworth may suppose it will take trifling power to raise water 120 feet high; he may suppose he can make joints, valves, and every possible outlet perfectly water-tight; he may snap his finger at friction, and declare he can obtain and control the power he proposes to exercise, but if he will persist in advancing such absurdities, I can have no hope of reclaiming him from his unenlightened delusions, and he must reap by sad experience what he refuses to learn at a cheaper rate.—Chilton, Oct. 19.

J. B. F.

THE SABOT, OR WOODEN SHOE.

Sir,—In every country, and in every change of place, there are many variations in the habits, tools, utensils, &c., in common use in civilised life. An attentive observer of these varieties will occasionally consider the comparative advantages of them, and it must always be a pleasing reflection if any good or beneficial result is derived from the communication of such observations, however homely and despised the subject may be. Having resided for some time in France, I could not help observing how general is the use of the sabot, or wooden shoe. Few people are [illegible] in [illegible] them, or even in their daily occupations, in the apparel of their feet, than the French—yet the peasantry of the country, almost without exception, use the wooden shoes. Washerwomen, dyers, masons, and other artisans, par, but the company having also commenced certain mines in the Munster Valley, which are not profitable, absorb the considerable gain obtained in the Kinzig Valley—the shares have now fallen to par. All the functionaries of this company unanimously complain of the want of energy and capital, and there is every appearance—indeed, almost the certainty—that the banker who is at the head of this company considers the whole undertaking in rather an unfavourable light.

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* Report of Commissioners on Supply of Water to the Metropolis, dated April, 1828.

† Dr. James Johnson, Medico-Chirurgical Review, Vol. [illegible]

2. The Alpirsbach Company, established some years since, has so small a capital, that successful results can scarcely be expected—very few miners being employed in the galleries of the mines worked by this company.

3. The company of Messrs. Georgii and Dortenbach, known as the Calio Company, also works with very insufficient means and few workmen. The capital employed in the mine of St. Michael was repaid last year, and the produce now not only covers the outlay, but yields a profit. In addition to these companies, single mines are always worked by single lessees, or by partners who hire closed works, or open new groves, and work them as time and money permit.

On travelling through the mining districts of Wolfach and Wittichen, I had the opportunity to make the acquaintance of many persons (managing captains, ground bailiffs, &c.) upon whose judgment I can with safety rely, as they have been bred, or naturalised many years ago, in this country, and are fully acquainted with all the events and incidents that have happened relative to the mines; they assured me that, according to the experience which they had gained as overmen, &c., in the mines of the other parts of Germany, and of the Continent, there could nowhere be found plainer and more positive signs of rich produce than in the above districts, and they say that this conviction is supported—1st, by the successful results of those imperfect and inadequate trials (for instance, the Herrensegen yielded about 60,000 florins—5000*l.* sterling, from 1820 to 1822, silver, copper, and lead, though worked by no more than five to seven workmen); 2d, by the inconsiderable depth in which precious metals are found, and which is not far from surface; and, 3d, by the richness of the ores considered by themselves.

The same opinion has been laid down by Dr. Kurr, professor at the Polytechnic Institute at Stuttgart, who lived for some time as mineralogist and botanist in Norway and Sweden, and studied also at the mines of the Harz and Erzgebirge. But, considering the opinion just expressed, the question may be put—"Why has no greater inclination been shown on the part of German capitalists to invest money in the mines of the Kinzig Valley?" The reasons are simply and plainly as follow:—

1. *The Want of Large Capital.*—Mining speculations are chiefly in favour and activity where superfluous capital exists, which is not absorbed by inland manufactures, agriculture, and commerce. In Germany, however, the interests of agriculture, manufacture, and commerce, made such a claim on the national means, that mining speculations could only originate and prosper in obtaining such minerals as have a direct connection with those branches of national labour—viz., iron and coal. All the German States stand in this latter position; wherever enterprises, in the modern time, originated for the purpose of obtaining the precious metals, the parties have been obliged, more or less, to seek foreign capital. This has been done in Rhenish Bavaria, Nassau, &c., where it is well known English capitalists work quicksilver, copper, silver, &c., mines—which mines, however, I can venture to assert, and without fear of contradiction, are beyond all doubt much inferior to the rich mines of the western Black Forest, especially those of the Kinzig Valley.

2. *The Want of Spirit of Association.*—In fact, this powerful animator of national industry and trade but awakes gradually since the establishment of the German steam navigation and railway conveyance, and it must be confessed that large sums have been and still are embarked in these enterprises; but this circumstance is one of the very reasons which causes speculation in mines to turn more to iron and coal than to the precious metals.

These reasons have hitherto prevented German capitalists from appreciating the Kinzig Mines as they ought to be—for amongst professional men there is but one opinion as to their importance and value; and, if no notice or attention has been bestowed on these works by *foreign parties*, the reason may be, because they heard that the working of these mines has never been quite interrupted, and, perhaps, no opportunity presented itself to engage in such enterprise—or, because the various companies in the Kinzig Valley had hitherto no opportunity to seek for foreign capital, or, more likely, neglected doing so, thinking to be able through their own means to obtain great results—and, moreover, feeling contented with the small profit which the working of alternate mines never ceased to yield them. Many sources of public and private wealth still remain neglected in Germany through indolence; striking instances might be mentioned to aver this fact with respect to other public enterprises—a case in point, for instance, are the Nassau Mines, which, though far less productive than those of the Kinzig Valley, were never thought of, until the formation of an English company drew public attention to them. Thus, endeavouring to describe the Kinzig Mines, and to invite foreign parties to a participation in these works, I do not know what influence the opinions I have expressed may exercise with respect to this enterprise; but I think the above statements and arguments will at least prove—

1. That the works in question would have long since been abandoned, were it not that, in spite of all these inadequate trials, the repayment of the outlays, or more or less profit, had been obtained by the different companies and owners, who have for many years been, and still continue to be, engaged in these works.

2. That all circumstances unite to encourage the hope, that a more systematic working would produce better results.

Nearly twenty years ago, a number of monied and professional persons associated for the purpose of forming a great company, which was to work upon a very extensive scale the mines situate in the Baden and Wurtemberg Black Forest, and more especially those of the Kinzig Valley; the name this company proposed to adopt was, the "Mining Company of Southern Germany." By the papers put forth at the time, and stating in general terms what I have now endeavoured to prove of the importance and value of the Kinzig Mines, it appears, that it was intended to obtain the support of the Baden and Wurtemberg Governments—but the latter imposed such onerous terms, that the whole plan was abandoned. Some time after, the French Revolution turned the general run of ideas; then the RAILWAYS began to attract interest and money—and it was but five or six years since that the idea of the "Southern German Mining Company" was renewed by the Baden Company, but on a very reduced scale.

CONDITIONS FOR SUCCESSFULLY WORKING THE KINZIG MINES.—The mines of the Kinzig Valley, since their first establishment up to this day, have never been worked on sound principles, or by means of sufficient capital; these want to be united to insure larger and continued profits, and insure what is chiefly to be desired—viz., to get the ores from greater depths, the mines as yet being nearly all established on the higher parts of the hills, to drive adits and levels from the valleys, for draining off the water, and get into the ore grounds, which have not been seen from the bottom of the old shafts; these operations will also naturally [illegible] to discover new lodes in the mountains, and then introduce into these mines a scientific system of working. Experience has proven that the mines of Kinzig Valley grow richer and more productive in depth; important trials made in several shallow pits of the St. Wenzell, the Frederic Christian, and the Herrensegen, prove this fact beyond doubt, but these were obliged to be abandoned from the want of means for overcoming [illegible], and the richest ores yet obtained are those in the bottoms of these shallow levels. It is, therefore, doubtless, indispensable, in order to insure success, to sink shafts and drive deep levels, which will then facilitate the works in the upper levels by drainage and giving air, open new lodes, and establish a system of working on a large and profitable scale.

Preliminary Arrangements.—The first necessary step for any company would appear to be, to obtain plans, showing all the mines in the district, with their various shafts, levels, cross-cuts, &c., pointing out distinctly the run of the lodes, to collect accounts of the various trials and experiments that have been made, and, upon these facts, to form their judgment, and then decide on which mine or mines the working should commence. A map of the mining district, with reference to the several [illegible], their course, length, &c., has already been commenced, which only requires to be completed for this purpose. In the next place, it would appear to be advisable to work such of the existing mines at their present [illegible], as promise an immediately successful result, then [illegible] to aid in the expenditure of the more extended workings. A certain number of mines are free, possession of which might be had at once, [illegible] are likely to be [illegible] left by their present owners, the [illegible] of the present working being the want of capital, science, and perseverance, and the [illegible] show that [illegible] has

reaped the fruits of his predecessor's labours; this may be easily conceived, when it is known that often not more than three or four pitmen are employed in one mine—the works proceed slowly, and the owner losing his patience, or his money, or both, quits the mine, which falls into the hands of others, who reap the benefits, which a little further perseverance would have secured to the former owner. That any company working on positive principles, and with some capital, is almost certain to reap a good profit, is sufficiently proved by the Baden and Calio Companies, and there is no doubt but that far more advantageous results would be obtained, if the undertakings were supported by more ample funds, as well as by the adoption of a more extensive and practical system of mining. Among the great number of mines abandoned, the following may be mentioned:—The St. Wenzell, in the Frohnbach Valley, district of Wolfach; the Alpirsbach Company would doubtless like the assistance of capitalists in working the David, in the Kinzig Valley, in the district of Wittichen, for cobalt and silver—add the Sophia, in the same valley, containing like ores; the Calio Company will offer the Herrensegen, in Wild Schappach Valley, district of Wolfach (argentiferous galena, copper pyrites, and malachite)—and the Michael, ditto, ditto. The Calio Company possess a smelt-house at Alpirsbach; but it would be, perhaps, found more convenient to reduce the ores in England, as the conveyance down the Rhine is no difficulty, and water carriage reasonable.

Workmen and Wages.—At first, there will be no want of workmen; new ones may be easily brought up, as the inhabitants of this country continue their old predilection for this business. The miners are known for their probity, frugality, amiability, and perseverance; they are never searched or surveyed, though they have frequent opportunities of selling valuable specimens of ore to travellers. Part of the work is paid for by the day, other given on contract; miners working on lodes receive 30 or 36 kreuzers (10*d.* or 12*d.*) for twelve hours, from six in the morning until six in the evening, including one hour for dinner; no night labour is performed at present, but the workmen would readily do so. Deads are given to contractors, and the prices per lachter vary from 12 to 100 florins (1*l.* to 8½*l.* sterling), in proportion to the difficulty of labour, and according to the hardness of the rock and quantity of water; one lachter is ten Baden feet (3·28 yards English)—the levels are seven feet high and three feet wide, the cubic lachter therefore contains 210 cubic feet of rock. Drifts and shafts, from the nature of the strata, very seldom need casing. There is also no want of overmen, viewers, &c., to begin with; and the salaries required will be very moderate.

Relations to the Baden Government and the Prince of Furstenberg.—Every new opening falls under the jurisdiction of the Baden Government, which, however, will by no means be felt in a troublesome manner; the Baden authorities are remarkable for their liberality towards every kind of national undertaking. Old mines fall under the control of the Prince of Furstenberg, who is ever ready to further by every means in his power any enterprise to be established in his territory, and gives every facility depending on his authority; there is also no doubt but that he would join any undertaking which might be established for properly working the Kinzig Mines. It may be asked, why the Prince does not himself undertake the mines of his territory?—The reason is, he has extensive iron works, in which he has embarked large capital within the last six years, they being more profitable, on account of the increased demand for iron in Germany, and their being situate in a mountainous district, where abundance of wood renders the working economical; he has already laid out 150,000*l.* on these works, and, it is said, objects to divide his means, by working on his own account the Kinzig Mines. Wood can be bought from the vast forests of the Prince at a most reasonable rate, 3 or 4 florins (60*d.* or 80*d.*) per cord—even if it could not be obtained gratis from him, for casing the shafts and levels.—Of the mines near Alpirsbach, in the Wurtemberg territory, nothing can well be said, until the Government of this State, seeing the success of the Baden works, should of itself offer to enter into some arrangements, and agree to renounce the unwise surveillance it is at present accustomed to exercise over mining matters.

Duties to be paid to the Prince of Furstenberg.—Per three months:

For every mine not yet productive	1fl.—1s. 8d.
For every mine where the outlay and returns balance each other	2fl.—3s. 4d.
For every mine paying well	4fl.—6s. 8d.

Quota of clear profit, 5 per cent.—or 1-20th share.

Amount of Capital.—To insure the success of the enterprise, the amount of capital ought not to be less than 1,000,000 florins, or 83,333*l.* sterling—[illegible] per cent. of which would suffice for the first working capital.

MODE OF ENGRAVING UPON, OR ORNAMENTING, STEEL AND OTHER METALS, BY MEANS OF ELECTRICITY.

The means which I propose, consists of an application of electricity, which I believe to be new, and shall be happy if it prove to be of practical utility. The manner in which I have succeeded in producing marks or sketches upon plates of steel is as follows:—I united six batteries of the kind invented by Mr. Smee, in each of which the size of the plate of platinized silver was about three square inches. I fixed the plate of steel to be engraved upon at the zinc end of the batteries. Having placed a wire of considerable length, covered with silk, between the plate of steel and the zinc, I took hold of the wire in communication with the platinized silver, and used it as an etching point upon the plate of steel. A bright electric spark, accompanied by a slight attack upon, or bite into the steel, was the result each time the wire came in contact with the plate. The wire, which served as a graver, was made of platina; the part which I took hold of was enclosed in a glass tube, in order to facilitate its being taken hold of and moved more easily, and to protect the hand against the electric shocks to which it would be exposed without this precaution. On using the wire, in communication with the zinc, as an etching point, and attaching a plate of steel to the platinized silver, a totally different effect is produced. With the apparatus thus arranged, the spark resulting from the contact of the wire with the plate of steel, is accompanied by the deposition of a very small portion of the wire itself upon the steel. By employing wires of different materials, such as gold, silver, platina, &c., a variety of ornamental designs may, no doubt, be produced upon surfaces of polished steel. The effects of the electrical influence above described are not confined to steel; a nearly similar result may be obtained by substituting plates of any other metal. It is to be presumed, that by augmenting the quantity and intensity of the electric currents, the effect upon the steel or other metal would be proportionably greater; and it is very probable, that by modifying the process, the application thereof might be advantageously extended.—J. H. Fabre: *Bulletin de l'Industrie.*

TO SEPARATE MANGANESE FROM ZINC DISSOLVED IN A LIQUID CONTAINING AN EXCESS OF HYDROCHLORATE OF AMMONIA.—M. Otto has proposed the following method for separating manganese from zinc, when they exist together in a solution containing much sal ammoniac. Ammonia is added, and the metals are precipitated by a current of hydrosulphuric acid; if acetic acid be added to the precipitate, the sulphuret of manganese will be dissolved alone.

CALOMEL.—It is known that the medicinal action of calomel is more energetic in proportion as the powder is finer. M. Soubeiran effects this pulverisation by means of a bellows, which drives a current of air through a large glass tube, containing the calomel heated so as to volatilise it. The current of air condenses the vapours, and carries them in the form of a very fine powder into an elongation of the tube connected with a recipient of water. M. Righini has shown that when the air is replaced by the vapour of water, a small quantity of corrosive sublimate is formed.

FORMATION OF AMMONIA.—M. Reiset has shown that a mixture of hydrogen gas and nitric oxide, passed through a tube containing heated peroxide of iron, gives rise to the formation of ammonia; in the space of half an hour he obtained sufficient to saturate an ounce of hydrochloric acid. The oxide of iron exercises simply a catalytic action, and is not reduced so long as there is an excess of hydrogen.

DETERMINATION OF THE COPPER IN A SOLUTION OF A BIOXIDIZED SALT.—M. Levol has made an important modification in M. Fuch's method for determining the copper contained in a solution of a bioxide salt, by the quantity of copper required to reduce it to the state of a protoxide salt. He places the solution of the salt in a vial, adds ammonia until the liquid becomes of a transparent blue, fills up the vial with boiling water, introduces a bright slip of copper, and closes it tightly—when the liquid becomes colourless, the copper is withdrawn, washed, dried, and weighed. The method has the advantage of being applicable to all the salts of copper, even the chloride.

OBSERVATIONS ON VOLCANIC LANDS OF THE PENINSULA.

Without entering into a minute consideration of the alterations which the crust of our planet has undergone in the different epochs of its existence, which would be quite unexpected in the columns of this periodical, we must only observe, that if we do but slightly examine our planet, we shall find that its rocks are not at present disposed in the same manner as they must have been at the period of their consolidation; some of them present the characteristics of being formed from sediment at the bottom of seas or lakes; others present signs of having once been on its surface in a state of fusion; finally, others, which corresponded with the latter, have been altered by more or less immediate contact with them. Rocks may, therefore, be divided into three grand sections—fused or non-stratified rocks, sedimentary rocks, and changed sedimentary rocks. Let the primitive state of our globe have been what it may at the time of the union of the molecules which compose it, it appears evident that at the end of a certain number of years, at least, the superficies of this globe must have tended to solidify, from the effects of its irradiation, which would cause it to lose much of the caloric, which would maintain them in a state of fluidity, though its interior would still continue in a liquid state. The solid part, by thus taking a new appearance, would diminish in volume, having to exert a certain pressure on the others; this pressure, sometimes united with the dispossessing of gases in the interior, would augment the tension of the inclosed mass, which, breaking the crust, would ascend to the surface, raising in some places the ancient levels, and in others forming considerable mountains. Calm being at length restored by the atmospheric pressure, and the tension of the molten and gaseous mass remaining in equilibrium, the general loss of caloric from the earth would still continue, the density of the solid crust would be increased, and would again exert its pressure on the interior mass, which would find vent through the crevices of the more ancient rocks, the consequence of which would be the re-appearance of fused rocks on the superficies, new chains of mountains, and other new rocks altered by the vicinity of the inflamed masses. This phenomenon has caused an indeterminate number of changes in our planet, and we are still witnesses of its effects, from the continual or periodical eruptions of the volcanoes; the miners observe it in the interior of their excavations, the geologists in the heights of the mountains; and in the present age, one of such observation and of analysis, we still go on explaining, by means of arguments deduced from facts, which we daily see manifested, an infinity of phenomena over which the ancients conflicted, and at last gave such explanations as were not even satisfactory to the authors themselves. M. Elie de Beaumont, by his system on the sublevations of rocks, has opened an immense field for the energies of the geologist, and has given a rational guide for the investigations of the miner. Although the number of eruptions be to the present time undetermined, as we before said—and M. Elie de Beaumont considers them as twelve only—we might still reduce them to five, if we would confine ourselves to the nature of the rocks which have appeared in these eruptions. They are:—1. Eruptions of granites, diorites, syenites, &c.; 2, of porphyries; 3, of trachites; 4, of basalts; 5, of modern lava. It appears that each of them has appeared in some determined epoch of the globe; the first is always met with in removing the rocks anterior to the carboniferous strata; the second is contemporaneous with the carbon; the third is the property of the secondary rocks; the fourth relates to the tertiary; the last belongs to the present epoch. All these eruptions have extended and compounded themselves continually one with another, especially the three last; it also frequently happens that all are found united in the same locality. The soil of our Peninsula is, up to the present time, very little studied geognostically; but, notwithstanding, we can present a number of facts which will serve as a basis to those detailed and grand undertakings which are still wanting. Those lands which can properly be called volcanic lands, and of the three last eruptions, are met with in Spain on a very extensive scale, and we have nothing to envy the other nations of Europe for in this particular. El Cabo de Gata and La Sierra Alhamilla, province of Almeria, offer upwards of twenty-two square leagues of trachites, which accidentally have in their mass granites, oolites, and sulphuretted and carbonated veins of lead and copper; in the plain of Mazarron (Murcia), also trachitic, there are others intersected with argentiferous galena of from 4 oz. to 5 oz. of silver to the quintal of ore. The rocks are frequently composed of prisms or columns of from three to eight sides; in the Morron de los Genoveses, the type of this basaltic formation may be seen, as well as the columnates, pumice, pieces, obsidians, &c., all united in a hill of from 80 to 100 varas in altitude, in which a crater is clearly seen, and in the middle eminence, at 1000 varas in distance, we meet with tertiary shells, enveloped in the ashes and fused mass emitted from the volcanoes. There is a volcano well known, and worthy of remark, at one league from Vera, in the above province, a hill which they call de la Virgen de la Cabeza, the lavas of which have covered a space of two square leagues, producing rare phenomena amongst the rocks with which they came into contact. The vicinity of Olot, in the province of Gerona, is also formed of basalts and modern lava, occupying a space of more than twenty square leagues; the volcanoes of Montsacopa, Montolivet, Santa Margarita, &c., are noted for their state of preservation; and the basaltic colonnade of Castellfollit is as picturesque and surprising as the Giant's Causeway and other parts of the Hebrides. The last eruption in Catalonia which history records was in 1421; prior to which for several years, according to the Padre Mariana, the earth rumbled all the way from Tortosa to Perpignan. In the northern side of the Sierra Morena, in the province of Ciudad Real, there exists now a volcanic soil of many square leagues, between Argamasilla de Calatrava, and the site anciently occupied by the city of Alarcos. There may be other volcanic lands in the Peninsula, but the above are the most remarkable.—*Translated from the Boletin Oficial de Minas.*

ON THE SALT PITS OF ROQUETAS.

The salt-pits of Roquetas are situated half a league to the east of the town of this name, in the province of Almeria, and consist of a deposit of saliferous clay and gypsum, in many parts covered by a conglomeration of limestone, &c., which extend almost over the adjoining plain. This calcareous conglomeration is not of much thickness, and is composed of fragments of various rocks, principally limestone, united by a kind of cement that is very abundant, and containing a great quantity of marine shells. The saliferous clay contains much of the oxide of iron, which communicates to it a strong red tint, and the salt is there found in a considerable extent. The gypsum which covers it in some places is generally a mass formed of small crystals of diverse formation. These salt pits are nothing more than a natural lake of about 1300 varas in diameter, in which the rains deposit themselves during the winter, which dissolve part of the salt contained in the clay forming the bottom, and return it again to deposit itself again in crystals in the spring, when the lake is dried up from the effect of the heat of the atmosphere evaporating the water. The lake is divided by art into four portions, by means of dykes of earth, and the rest of the labour is almost left to Nature; from this neglect, the annual produce has fallen from 50,000 fanegas per annum to hardly 30,000, and the article is much more inferior by the mixture of earth and other impurities. By taking precautions to limit the influx of sand and the rubbish brought down by the waters, so as to preserve more pure the salt, these mines might be rendered extremely profitable. But we think, notwithstanding, that neither this establishment, nor the others which Spain possesses, will ever realise the grand results of which they are susceptible, until their direction is placed under a board of mining engineers, as is the case in France and other nations.—*Boletin Oficial de Minas.*

NEW SULPHUR ACID.—MM. Fordos and Gélis have discovered a new sulphur acid, which has a singular composition. When to two equivalents of hyposulphite of soda (NaO [illegible]) one equivalent of iodine is added, the iodine dissolves and affords a limpid and neutral solution, containing 1 at. iodide sodium and 1 at. of a salt formed of 1 at. of soda, 4 ats. of sulphur, and 5 ats. of oxygen. The two atoms of hyposulphurous acid combine in this re-action, with the oxygen liberated by the iodine, forming an acid composed of 4 ats. sulphur and 5 ats. oxygen. They have called this acid hyposulphuric bisulphuretted.

TENSION OF SULPHURIC ACID.—It has been shown by Bence Jones and by M. Vogel, that air or gas passed over sulphuric acid to be dried, always contains a small portion of this acid. M. Vogel placed under a bell glass some concentrated sulphuric acid, with a plate containing the chloride of barium; they were left together for ten days, and upon dissolving away the chloride, he obtained a residue of sulphate of baryta weighing 1·011 grains.

SUPPLY OF PURE WATER TO THE METROPOLIS AND ITS SUBURBS—PROPOSED NEW COMPANY—No. III.

We have endeavoured to gain information from various sources respecting the state and purity of the Thames water, and its fitness for domestic use, and from such inquiries it appears proved to us that the impurity of the water is extremely bad, foul, and dirty. As it comes in from the company's pipes, this is apparent, for, upon looking at it in a glass, you will discern a great deal of suspended impurities floating in the water, and it requires some hours before a subsidence of these impurities take place, and the accumulation of deleterious impurities occurs to a dangerous extent—in short, it is a concentration of unwholesome qualities. As an example, we may mention, that in the space of a few weeks, the bottom of cisterns is covered with mud, so as to require washing out, before the water will pass freely. The quantity of mud found in the tanks on an average is two to three inches in every six months, and the water, after standing a day or two in the butt in hot weather, a great many animalculæ and red insects like shrimps are perceptible; and washing women have found the water very impure, and could not use it; the clothes that were washed in it were tinged, and made of a bad colour; in fact, it is well known that the Thames water has suffered a gradual deterioration within the last quarter of a century. "This opinion is found upon the ascertained fact of the disappearance of fish from those parts of the river, to such an extent as to have led to the almost entire destruction of the fishermen's trade, and upon the circumstances that the eels imported from Holland can now with great difficulty be kept alive in those parts of the Thames where they were formerly preserved in perfect health, and it is well known that the fishmongers in London find it impossible to preserve live fish for any length of time in water taken from the Thames."* The eels are imported from Friesland, in Holland, and formerly the vessels used to come up at once to Billingsgate, but now they are obliged to wait some time down the river before they can come up, for the eels to get inured to the water; at one time they would live a long while in the river which runs through the wells where the eels are kept, and it is an attested fact that when the wells are opened at Billingsgate, there is quite a stench arises, and it is like oil on the top of the water; and ships have been known to lose a cargo of eels in one night, averaging from 1200 lbs. to 1400 lbs. weight, when the hatches are opened in the river, from gas water passing the vessel, which shows itself like scum shining on the water. The fishermen used to catch fish in the Thames, but owing to the bad water the fish died, and the men sold their boats, and have for many years been compelled to buy eels at the market to sell again; this business was carried on entirely by poor people, and a great many persons were employed in the eel trade, and entirely depended upon it for support. Mr. John Goldham, yeoman of Billingsgate-market, whose business it is to ascertain the quality of the fish, to seize and condemn that which is bad, stated in his evidence on the state of the Thames—"That twenty-five years ago there were 400 fishermen, each having a boat and a boy, fishing above and below London-bridge, from about Deptford to Richmond, and the fish they caught were roach, plaice, smelts, flounders, salmon, shads, eels, gudgeon, dace, dabs, &c., and they gained their livelihood entirely by fishing in the river; I have known them to take ten salmon, and as many as 3000 smelts at one haul, up towards Wandsworth, and as many as 50,000 smelts have been brought daily to Billingsgate, and as many as 3000 salmon have been brought to Billingsgate-market in the season, caught in the river Thames. The quantities did not begin to fall off till fifteen years ago, and every year since that period there has been a diminution in the quantity; and now there are not 200 men engaged in the fishery, and many of them are now selling off their nets and boats; last week one man caught only twenty-six smelts, and I have not seen salmon for these ten years, except a straggling fish now and then caught high up or low down the river. I attribute the cause of the loss of the fishery to the great number of the drains which run into the common sewers, as well as the privies and water-closets; formerly the scavengers used to carry away the soil at night, but that practice has of late years been much diminished; the filth that they used to carry away is passed by the drainage into the sewers. In the river at Billingsgate we have many Dutch boats with eels; I have been on board and have seen 4000 alive in the wells, and the next morning three-fourths have been dead, and the same proportion of loss has been sustained by all the Dutch vessels." It is a matter of fact, therefore, that the increase of manufactories within the last ten years, and the accumulation of filth brought down by the rains in dry weather stirring up the filth of the Thames, and keeping it in a state of almost continued agitation, must greatly tend to injure the water, and it is proved that many fishermen have been ruined by the change in the water. Another instance, the gas liquor is let out in the middle of the night, the river is often covered with it, having the appearance of an oily substance, in patches of four or six feet square. The tide ebbs seven hours, and goes about three miles per hour, and this will carry it on this side of Gravesend, and as the tide flows five hours, this substance returns with the tide; in proof of the impurity of the water in the Thames, the flounders which are brought up from sea-reach, Medway, &c., when they get to Woolwich, fly about in the wells of the boats, through which the water flows, and they turn up and die; and now they are taken out of the wells about Woolwich and put on the decks, then into baskets, and brought up dry to London.

The statements which have been made respecting the insalubrity of the Thames water as supplied by the several water companies, were minutely considered by Parliament, and cases have been brought before them of disorders imputed to this cause, such as to warrant us to draw general conclusions, and we think the subject is by no means undeserving of attention. It cannot be denied that the continued use of a noxious ingredient in diet may create predisposition to disease, and of which the immediate operation must be extremely insidious and difficult to trace, and the most eminent professional men have given it as their opinion that the Thames water is unfit for the breakfast table, nor fit to be used in the making of bread puddings, broths, soups, and in boiling meat and vegetables, and the use of such water had a direct and positive tendency to engender those diseases to which the inhabitants of so densely peopled a city are especially liable; it may not be generally known that the mortality on the south side of the Thames is greater in proportion than in any other part of the metropolis, this is traced to the foul and polluted source of the Thames; and medical men have stated also, that persons affected with pain after taking breakfast and tea, is attributed to the water, and bowel complaints also are traced to the injurious effects from the use of Thames water. It has been uniformly the case, after repeated trials, that water obtained from springs or from a pure and salubrious river, complaints have subsided, and the fact is well known that diseases distinctly increase after using the Thames water. With the view that the public may acquire a knowledge of the salutary properties of this great element of life, to make them alive to the dangerous qualities resulting from the use of water loaded with all sorts of impurities, we introduce some authorities to show that our opinions are not lightly formed, but based upon those of wise and eminent men.

Dr. Hume.—"I have no hesitation in saying that the water of the river Thames is loaded with mud and all sorts of impurities, that I have never been able to use it for any purpose whatever, except that of ablution, and even for washing it has been almost always in winter so foul and dirty, and in the dry hot weather of summer so filled with animalculæ that it has been necessary to filter or boil it before it could be used without disgust."

Dr. Hooper.—"I have been aware of the very impure nature of the water supplied from the Thames. It was not only filthy in appearance, but occasionally it had an unwholesome smell. Scarcely a week passes that I am not presented with a leech, a shrimp-like skipping insect, near half an inch in length, a small and delicate worm, which I believe is the *lumbricus fluviatilis*, or some other animalcula, and the water is usually opaline, muddy, or otherwise impure."

Dr. Paris.—"As a physician I have devoted much attention to the subject, and am of opinion that the Thames water is injurious to health, and cannot find terms sufficiently expressive of the awful effects it may be likely to produce upon the health, and even lives, of the inhabitants of the metropolis. I visited a family who were all ill, and I believe their illness arose from drinking the water—they changed the water, and got well."

Dr. Kerrison.—"I am of opinion, that the water obtained from the Thames about London is unwholesome; it will not be easy to state any particular facts of disease brought on by it, further than the fact that water loaded with a kind of impurity of animal and vegetable matters, in a state of suspension and solution, leads to diseases of the viscera, enlargement of liver, dyspeptic complaints, disturbances, and indigestion. I believe a general insalubrity must exist in the Thames water, and more or less communicate itself to all individuals who partake of it as their general beverage, and for the preparation of their daily food."

"We sneer at the delicacy of the Hindoo, who slakes his thirst at the same tank where his neighbour is sacrificing to Cloacina, but what shall we say to the delicate citizens of London who fill their tanks and stomachs with water from the Thames at that very spot into which 100,000 closets, containing every species of filth, and all unutterable things are daily disgorging their hideous and abominable contents. It is absolutely astonishing that in these days of refinement, and in a metropolis whose inhabitants pride themselves on delicacy and cleanliness, a practice should obtain, at which posterity will shudder, if they can credit it. We do not believe that a parallel instance of bestial dirtiness can be cited from any part of the globe. A time must come when the people of London will open their eyes to this scene of corruption, veiled and concealed as it is by iron tubes and and stone pavements. We are not among the idolators of the ancients, but we do admire the delicacy of their taste in expending so much labour and wealth in commanding abundant supplies of pure and salubrious water for the everlasting city. It is difficult to say how far the health may be affected by drinking from such a polluted source; but surely such deleterious substances, however minutely divided, cannot be salubrious. It is, therefore, probable that part of the insalubrity of the city, as compared with the country, may be owing to this cause."†

Dr. Wilson Philip, the author of the *Treatise on Indigestion*, declared that its impurities were so evident to the sight, that to certify that it was "unfit for culinary and domestic purposes," was altogether unnecessary.

Mr. Abernethy, Dr. William Lambe, Mr. Thomas, Sir B. Brodie, Dr. Yeates, Mr. Keate, Sir Henry Halford, Dr. Turner, Dr. Macmichael, and Dr. Robert Bree have all attested to the fact, and placed their opinions on record, that the water of the Thames is loaded with noxious matter, much of which is obvious to the eye, and much, no doubt, contained in solution, and that the daily use of such an article of diet must be unwholesome, and have a tendency to produce, or is a cause of, many diseases, and it is a question of much importance, whether such matters in the stomach do not greatly contribute to the production of that faulty digestion and impurity of blood, of which the inhabitants of this metropolis are constantly complaining. It is obvious, then, that salubrious water is of the first importance to health, and we have no hesitation in submitting our opinion, on the authority of men eminent in medicine and science, that a train of evils are the consequence of the use of water loaded with filth and decomposed vegetable matter, and so far impure and unwholesome as to render every meal injurious to thousands, and the comparative unwholesomeness of water for domestic purposes that is daily gorged with the refuse and sewers of London, thereby becoming hourly more extensively deleterious to the inhabitants of this metropolis, is a fit subject to be submitted for the decision of the Royal College of Physicians.

We have some observations to make on the analyzation of the Thames water, showing that it is permanently impregnated from extraneous matter held in solution, and also as regards the method of clarification by the system of subsidence and filtration, proving that it is ineffectual to restore the filthy and unsound fluid to a healthful condition. These questions will illustrate the case of our fourth allegation; but on which we shall defer our remarks to another Number of the *Mining Journal*.

ORIGINAL CORRESPONDENCE.

THE DISCOVERY OF GOLD AND SILVER IN NORTH WALES.

SIR,—I observe in the last *Mining Journal* that you state Mr. A. Dean to have recently discovered the existence of a complete series of gold veins in the lower Silurian formation of North Wales. Now, Mr. Editor, the purpose of this letter is not with the intention of denying the existence of the gold and silver veins in this country (of which there are abundance), but to inform you and the public, that *I* have the right of claiming the discovery of the precious metal in North Wales. "*Facts are stubborn things*," and these can be advanced to support my position: In the year 1836, when engaged in mining, I had samples of ore assayed, and which proved to be very rich in gold and silver; but, not being aware that the working of such ores would be allowed in Wales, I left off further search, until the year 1843, at which time I purposed giving you the result of my labours, but, from press of other matters, unfortunately, as it now turns out, was prevented. Mr. Dean, I believe, has now been engaged in mining operations in this country about twelve months; on his first appearance here, I certainly *informed him* of the existence of the precious metals in this country, and which, apparently, much astonished and delighted him; since that period, however, he, having been engaged in working some mines in this neighbourhood, I expect has cut into one of the veins and found gold, and now starts up, to my great surprise, and claims the right of being the first discoverer of gold in this country. How far he is entitled to that distinction, I must leave to you, Mr. Editor, and the public, to decide, after reading this letter.

ROBERT ROBERTS.

Dolgelley, North Wales, Oct. 27.

NEW APPLICATION OF THE STEAM WHISTLE.

SIR,—I observe in your paper of Saturday last a paragraph headed "Important Application of the Steam Whistle," for preventing accidents to steam-boilers, and now in use in one of the principal manufactories in Leeds. The manner in which you describe the action of the whistle makes it appear a very simple and efficacious plan, were it feasible; but I must confess that I cannot see any possibility of its being so. In the description, the whistle is stated to be placed on the boiler, having a pipe inserted a certain depth in the water, so that when the water leaves the end of the pipe, the steam rushes into the whistle and creates an alarm; now the difficulty is to prevent the water, under a pressure of steam, from rushing into the whistle, and so keeping up a continued noise. Every scientific and practical man knows, that water under pressure will act in a similar manner to steam, except there be a column of sufficient height to counteract the pressure—viz., an elevation of two feet for every pound pressure, and to obtain this column is in many cases impracticable. If a column of water is used, then the plan dates from the time of Boulton and Watt, and is applicable only to some low pressure boilers, certainly not at all to high pressure, as these would require a column of from 50 to 100 feet high. Any other information you may be able to afford on this subject will be most gratefully received by, Sir, Yours, &c.,

THOMAS LIDDELL, Engineer.

Pilgrim street, Newcastle-on-Tyne, Oct. 28.

THE GREAT DESTRUCTION OF HUMAN LIFE IN THE MINES—MINERS' COUNSEL.

SIR,—You have announced in the *Journal*, that the late appalling catastrophes in the coal mines have aroused the slumbering feelings of humanity in the breasts of those who have the power to afford to the [illegible], and forgotten working miners, some protection at least; and that, probably owing to a sense of the responsibility they are under, we may confidently anticipate, early in the next session of Parliament, the introduction of some remedial or preventive measure. This is welcome, cheering news; it is hard to think that the mineral which affords us one of the very first comforts of civilised, and indeed of general, life, is procured only by the constant sacrifice of the lives of the workmen. It appears that on an average the lives of several men are each day cruelly sacrificed in the bowels of the earth, not so much in order to procure the commodity coal, as owing to the present imperfect system, or rather non-system, of procuring it; a sort of system, if it must be called one, which depends on rude deputy-foremen—foremen, such as they are, paid by the masters—and who cannot protect the men without touching their master's purse, either positively, by calling for better machinery, &c., or negatively, by suspending the work of the mine, while the costly work of the pumping-engines must be continued, though it produce them no return.

It is a question what the remedial measure will be which Parliament may recommend? I think a very probable conjecture may be formed of its nature, for we know that inspectors are quite in vogue with the legislature; and inspectors are good in their place. For remedial purposes it is to be hoped, they will answer very well, but I fear their efficiency may be doubted for corrective purposes. Thus, if hard-working educated men—men who are not above the every-day discharge of their very responsible duties—are appointed, we may hope the present fearful casualties will diminish at least 50 per cent.; but, in case of a destructive explosion, I think we should be looking for rather more, nay much more, than we usually meet with in life, if we expected these inspectors to discharge their duties with the old Roman sternness; that is, to shut their ears to the [illegible] expostulations and representations of the [illegible] masters, and their [illegible] representatives, among whom they will [illegible] and with whom many of their most friendly and convivial hours will be spent, in order to exert their strict and *fully* active interposition in behalf of the poor victims, and in support of the dreadfully lacerated feelings of their widows and orphans. And pray observe, Sir, that the masters in such a case, might think themselves quite *honest* in their representations—for we must remember that *self*, when exposed to risk or censure, will throw dust into the eyes of the best of us—and also that the judgment of the inspectors, under such circumstances, would be too liable to be biassed by feelings of kindness and social *friendship* for the masters. But if inspectors, who wish to discharge their duties honestly, might be so biassed, what would be the case if there happened to be a dishonest inspector; I mean one who had winked at evident negligence in the management of the mines in his district, or who had neglected duly to inspect them personally. The dishonest man would certainly lean to the masters and against the men, to any extent, to hush up inquiry and save himself.

I hope, then, Government will employ inspectors, *but not stop there*. In case of any of these direful casualties, other parties should be called in; and I would here humbly recommend the appointment of miners' counsel; these counsel to be appointed by the judges on circuit, and, to insure their vigilance, to be removable at pleasure—the instruction to the judges being that they should appoint counsel living within easy reach of each mining district—say within forty or sixty miles per railway—but not residing in it, nor with any of their immediate connections engaged in the coal trade. It is evident the proper counsel would have to be summoned immediately by the coroner, in case of any accident, and should possess a legal right to appear at the inquest, to call evidence, and generally to represent the cause *of the dead*, and to claim justice for their living relations. The men should *speak out*, when, as usual, first privately examined for the purposes of the inquest, by these gentlemen; but to make a show of inviting them to speak out, one by one, when surrounded by the masters, or their representatives, at the inquest, unlettered and *unsupported* as they are, and with their future means of subsistence entirely in their master's power, is a *farce*—under the circumstances, a most cruel, and let me add, degrading farce. If they are to speak out at all; that is, if they are to speak the open truth, instead of masking it, even at their own personal peril, a rallying point must, and *ought*, to be afforded them, and some prospect of work elsewhere should be held out to them, if afterwards turned adrift, with their wives and children, from the pit now supposed in question. Such alternative an active counsel, who felt that the zealous discharge of his duty was his interest as well as his highest qualification, would to a considerable extent afford them—that is, supposing the masters were dishonest, which the poor fellows, when their all was at stake, would be liable to fear, though they might not be so. At a late awful calamity, one of the few men drawn up alive was asked, when he came to the surface, what was the cause of the accident, and answered, I think most significantly, that some parties knew the state of the pit; but I believe there was no evidence of a similar purport given at the inquest. It was extraordinary also that the owners appeared very anxious to have the men examined individually, and yet extremely averse to their legal agents interfering, who would have represented the body of men *collectively*. I ask is it reasonable, to say the least of it, to propose that each individual (unsupported) poor man should come forward, ostensibly to have the opportunity of giving evidence, most seriously implicating his master, or his representative (supposing he should be in possession of such evidence), while the union poor house, whether justly or not, would most certainly be vividly present before his imagination?

A generous, noble cry of "benevolence to the poor" is spreading over the land; let, then, this be the beginning of the new, and better system; let their protective rights be fully secured to them, and no shameful plea of economy stand between that sound kind of justice, which cannot well be put aside, and mens' lives.—*Oct. 30.* MECHANIST.

THE HYDRAULIC RAILWAY.

SIR,—Mr. Shuttleworth upholds his favourite scheme with some ingenuity, and much plausibility of argument. In my first letter, animadverting upon one from himself, I condemned the pre-supposed hold he was obtaining on popular opinion in favour of his hydraulic system—such not being the fact, but, even if it were, popular feeling is not of itself evidence of the scientific soundness of a mere theory. As a proof, it is some time since every public journal teemed with graphic illustrations and high-flown descriptions of Henson's flying machine, which, nevertheless, to this hour, proves to be "of the earth earthly," and is just as likely to fly aloft as the hydraulic railway is to carry a single passenger. Mr. Shuttleworth, in replying, commences by charging me with "dogmatism," with "declamatory eloquence," and, by inference, with "deficiency in any mental or other attribute." In short, I am a gross ignorant fellow—of what society remains to be determined; I am one of his "half-hour students, whose presumption prompts them to look over the pages of science, rather than to study them." After this polite handling of me, I am assured by Mr. Shuttleworth, in conclusion, that "if I will restrain myself within the usual tone of gentlemanly correspondence," he will be equally gentlemanly on his part—a slight inversion of the golden rule of "doing unto others as we would they should do unto us." But, to be sure, an antagonist, especially an anonymous one, is always a butt for abuse. I do not wonder at your correspondent "B.'s" surmise that I have not read Mr. Shuttleworth's tract, for certainly of all the wordy, incomprehensible productions I ever waded through, it is one of the most unfortunate, making "confusion worse confounded." It is a great pity that some intelligent scientific man was not consulted and engaged to write something, at least, comprehensible. I have not met with any member of the Civil Engineer's Institution who has had, like myself, patience to read it through, and, after reading it, I am nowise enlightened by its perusal, except it be that I have obtained knowledge of another instance of a self-taught man, infatuated with an extraordinary mechanical hobby. Wiser men than Mr. Shuttleworth have had their hobbies, and have ridden them all their lives with about as much pleasure, and certainly all the success that attends seeking for a perpetual motion, or the philosopher's stone. Imagine an horizontal pipe of twelve inches bore, with a slot through its upper side, closed inside by an elastic valve—imagine, further, that at every seventy yards, or more, vertical pipes, 150 feet high, and one foot in diameter, branch from it. Now, for what earthly purpose should we conceive this monstrous apparatus was intended? It might make a splendid fire extinguisher, and, without going to Bath, we might see magnificent jets of water of all dimensions playing away in first-rate style. But the idea of placing passenger and luggage trains on this spouting nondescript would never occur to any hydraulic engineer, and appears to me too absurd to require closer investigation. Either the valve will be closed so tight that Mr. Shuttleworth may defy all motion, and all escape of water—or, otherwise, it will have such abundant play that the carriages will be shot off with a certain amount of velocity, amid the play of myriads of fountains, and a deluge of spray, to the astonishment, if not the delight, of all bystanders. This, then, is one of those [illegible] schemes which will end in talk, or sink a fortune to prove its utter fallacy; but no mere argument will convince the inventor, who has evidently made up his mind not to be convinced that he is wrong, although philosophers disapprove his plan, and the public are too convinced of the fallacy of his principle to incur the slightest risk by the advance of capital. Not one scientific authority lends testimony to the soundness of his strange theoretical views, neither would any man having the least respect for his scientific character venture to countenance a system which outrages all science and common sense. Mr. Shuttleworth may suppose it will take trifling power to raise water 150 feet high; he may suppose he can make joints, valves, and every possible outlet perfectly water-tight; he may snap his finger at friction, and declare he can obtain and control the power he proposes to contain, but if he will persist in advancing such absurdities, I can have no hope of reclaiming him from his mechanical delusions, and he must pay by sad experience what he refuses to learn at a cheaper rate.—*Chelsea, Oct. 17.* J. B. F.

THE SABOT, OR WOODEN SHOE.

SIR,—In every country, and in every change of place, there are many variations in the habits, tools, utensils, &c., in common use in civilised life. An inquisitive observer of these varieties will occasionally ascertain the peculiar advantages of them, and it must always be a pleasing reflection if any good or beneficial result is derived from the communication of such observations, however hastily and diffusely the subject may be. Having resided for some time in France, I could not help observing how general is the use of the sabot, or wooden shoe. Few people are aware in [illegible] the [illegible], or what is their daily [illegible], in the apparel of their feet, than the French—yet the peasantry of the country, almost without exception, use the wooden shoes. Washerwomen, dyers, tanners, and spirit [illegible] who often stand in cold and damp situations, generally use them. I know several ladies and gentlemen in Paris and the suburbs who used them to walk in their gardens, or elsewhere, on a wet day, or after rain, and their use appears to be so economical, and so efficacious in securing the feet from that dangerous cold dampness which an absorbent material like leather retains when wet, that I think if a trial of them was once extensively made in England, their advantages would be established; but particularly in mining operations, which are often carried on in wet and damp situations, perhaps, these wooden shoes would be a comfort to the workmen, and I trust, as your useful and widely-circulated *Journal* is read by every one concerned in mines, that some public-spirited individual may make a trial of the wooden shoes for his miners, if they are not already in use, and thus contribute to preserve the health of those who labour for him. The protection afforded by an Indian rubber boot or shoe, or by the varnished patent leather, is very different, for these fit so closely to the feet, that they, by their impermeability, confine the hot air and perspiration—while the wooden shoe, from its fitting loosely, is free from these defects, and no one could wear the Indian rubber boot or shoe, or the varnished leather shoes or boots constantly, for any length of time, without injuring the feet. The wooden shoes might be made more durable and less absorbent than wood in its natural state, by impregnating them with various non-absorbing, hardening, and waterproof ingredients, on the principle of Mr. Payne's process, which is effected by exposing the wood first in vacuo, and then allowing the impregnating substances to be absorbed in the pores of the wood, by the atmosphere, or more powerfully by hydraulic pressure.

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* Report of Commissioners on Supply of Water to the Metropolis, [illegible]

† Dr. James Johnson, Medico-Chirurgical Review, [illegible]

Kensington New Town, Oct. 29. SAMUEL PARLBY.

TO THE SHAREHOLDERS OF THE EDINBURGH AND GLASGOW RAILWAY.

GENTLEMEN,—Your chairman has obligingly, but in a manner personal to myself, furnished you each with a report of the proceedings at the recent special general meeting of the company, which was attended by twenty-five persons, including reporters and clerks, and held for the purpose of voting away 100,000*l.* (which must be borrowed) to the Kilmarnock, Dumfries, and Carlisle scheme.

He has also kindly repeated what I had previously mentioned—namely, that I am (by inclination, not from necessity) the holder of only one share of the company's stock; and he might have distinctly stated that I am (in place of insidiously saying that "I was") vice-chairman of the committee of management of the Caledonian Railway Company.

He might have further informed you of the fact, that I purchased *that one share* of your stock for the purpose of bringing, on a late occasion, to the aid of your board of management, on a vital question, a considerable amount of support; and he might have added, that at a late general meeting of the company, the holder of that one share was solicited by the secretary, and had the honour of declining, to propose a vote of thanks to the chairman.

So far, gentlemen, for the information, personal to myself, furnished by your chairman in his recent [illegible], perhaps, not being likely to promote a friendly conference with the promoters of the Caledonian line, as promised to Mr. [illegible] by your chairman. But—

He has not acquainted you, either in his recent address, speech, or letter, with the amount of your stock held by the gentleman who spoke at the late meeting against your granting 100,000*l.*, and who concluded by adhering to the protest.

He has not informed you how highly successful were the committee of the Kilmarnock, Dumfries, and Carlisle scheme, when they "sat in London for the purpose of assigning such shares, in limited numbers, to such parties of respectability as should apply personally, or by letter accompanied by reference!"

He has not told you what number of shares of this Kilmarnock, Dumfries, and Carlisle project have been applied for or allotted, nor what amount of deposit has been paid thereon.

He has failed to acquaint you with the amount of *moneyed interest* taken in this scheme by the districts around Dumfries, Kilmarnock, and Annan, through which the pet line is proposed to pass; nor has he said that the noblemen and gentlemen, proprietors of the soil, have agreed to the line being taken by the *best and most direct route*.

He has not told you how *deeply interested himself* and some of his colleagues, and the generality of the officers of your company, are in the success of the Edinburgh and Berwick Railway, the Glasgow and Ayr Railway, and the proposed Kilmarnock, Dumfries, and Carlisle Railway.

He has not shown how, that, as chairman of the Berwick Railway, it is his duty to draw to that line all traffic passing to and from the south of your railway—to the great loss and detriment of the railways lying to the south-west of the Island.

He has not alluded to the powerful interest and high recommendations that the proposed Caledonian line, as a direct line and national benefit, is likely to command.

He has failed to remind you, that the committee of management of the Caledonian Company are the trustees of a large sum of money, *raised for the purpose of obtaining an Act of Parliament for the formation of the line.*

And, lastly—He has not said that there is to be any limit to the expenditure of your company's funds in opposing the Caledonian Railway Bill.

GENTLEMEN,—Your chairman having altogether omitted to advert to these particulars, I take the liberty of bringing them under your notice—and am,

Your obedient humble servant, WILLIAM GRAHAM.

PROPOSED RAILWAYS BETWEEN ENGLAND AND SCOTLAND AND THEIR FRIENDS AND ENEMIES.

TO THE EDITOR OF THE MINING JOURNAL.

SIR,—It has been often remarked that there never was an improvement in the arts or practical sciences, nor even in the abstract sciences we might add—any improvement, in short, from which the community generally was understood to be certain of deriving benefit—that was not unfortunately attended with injury to some individuals. One example of this law has been, the suffering of the stage coach interest from railways; perhaps there never was a more extensive sacrifice of the interests of the few to those of the many than that of the stage coach proprietors—yet no one beyond their own circles has pitied them, and no legislative protection has ever been given to them, and, indeed, scarcely even seemed to have been looked for. No one denied that theirs was a hard case; but neither did any one deny the great law, that improvements must go on for the sake of the public, although they may injure individuals, and [illegible] the proprietors of the old railways [illegible]. The Edinburgh and Glasgow Railway Company, for instance, at their last meeting, seemed to [illegible] the Caledonian Railway, which is to connect Edinburgh and Glasgow, and the counties north of the Forth, by the most direct route, with the great manufacturing counties of England; [illegible] the two limbs of the Caledonian, diverging near Carnwath, the one to Edinburgh, and the other to Glasgow, may be used as a line of communication for passengers and goods between these two cities. Now this alleged competing line, formed by the two limbs of the Caledonian, will take a passenger about fifteen or twenty minutes longer travelling than the present Edinburgh and Glasgow Railway, and therefore one would hardly have anticipated so great dread on the part of the old company. But let us (the public) inquire, as we are deeply concerned to do, what is the real cause of alarm to the Edinburgh and Glasgow Company?

In the first place, at the very time when Locke, [illegible], and other scientific engineers had discovered that locomotive engines could take ordinary trains over lifts of 1 in 70 to 1 in 100, with scarcely any loss of speed, the Edinburgh and Glasgow Railway Company [illegible]. They are therefore bound to high charges.

Secondly—The Edinburgh and Glasgow Railway enters Glasgow by a tunnel and inclined plane, a mile and a half long, and as steep as 1 in 42, on which several accidents have occurred; and up which, the trains being drawn [illegible] passengers are subjected to [illegible]

[illegible]

will protect the public against the self interested exertions of the Edinburgh and Glasgow Railway Company, who, from commanding wealth and influence, along with the services of a body of subtle and experienced agents, afford an instance of the selfish principle of human nature being in a high degree dangerous to the community, and calling for much vigilance on the part of Government and the Legislature. ONE OF THE PUBLIC.

CORNWALL AND DEVON CENTRAL RAILWAY.

On Tuesday week a meeting was held at the Molesworth Arms, when E. HAMBLY, Esq., presided.—The resolutions were passed without a dissentient for the north, or central line, and Mr. W. K. NORWAY, an influential gentleman of the vicinity, said—"It would seem as if it had been the object of the framers of the south line to keep at the greatest possible distance from any point at which a junction could be formed with the Wadebridge Railroad, so as to deprive Bodmin, Wadebridge, and Padstow, and the whole of the north of the county, of the commerce and traffic which, from their position, they were capable of maintaining."——On the Wednesday a meeting assembled at St. Columb, at which H. WILLYAMS, Esq., was chairman, and was supported by several influential magistrates and gentlemen of the district.—Dr. CLEMENTS, in moving the first resolution, said—"He could not conceive how any one having an interest in Falmouth could favour a south line, for it would make Falmouth an out-port of Plymouth."—Mr. HAWKEY believed that a central line ought to be supported, because it was most required.—The meeting decided, unanimously, for a central line; and, in acknowledging a vote of thanks, the CHAIRMAN said he had been a member of the committee which had determined on a south line, but when they went wrong by so determining, he cut their acquaintance.——On Saturday a meeting was held at Helston, at noon, pursuant to a requisition signed by 180 householders.—The chair was taken by FREDERICK HILL, Esq. (the mayor), and was very fully attended by the most respectable inhabitants of the town.—A perfect unanimity of feeling in favour of the central line, and against the line from hence to Plymouth, prevailed.—The meeting was addressed by Mr. Tilly, Mr. Snow, the Chairman, and other gentlemen; after which a series of resolutions were passed unanimously in favour of the Central Cornwall and Devon line. The speeches were exceedingly interesting, and were received with much applause.——On Monday a numerous and influential meeting was held at the Guildhall, Truro, his Worship the MAYOR (N. F. Bennet, Esq.) in the chair, "to take into consideration the propriety of memorialising the Board of Trade, and of adopting a petition to the House of Commons in favour of the proposed central line of railway through this county, and of entering into such resolutions in reference to such railway as to the meeting may seem expedient or necessary."—The meeting was addressed by the Chairman, Messrs. Stokes, T. H. Tilly, T. Harvey, H. Williams, R. Taylor, R. Harvey, J. [illegible], W. Edwards, E. Turner, M.P., W. E. [illegible], J. T. Treglian, and John Taylor, F.R.S.; and all the resolutions were unanimously carried.

YORK AND NORTH MIDLAND RAILWAY.

An important meeting of the shareholders was held at the railway station, York, on Monday last, for the purpose of sanctioning an application to Parliament in the ensuing session for power to enable the York and North Midland Railway Company, or some other company in connexion with them, to make the following lines of railway—viz., a line from the York and North Midland Railway to Doncaster, one to Harrowgate, another from Selby to Goole, and a railway from the York and North Midland (Scarborough Extension Railway) to Bridlington and Driffield, and to raise the necessary capital.

After Mr. BAKER (secretary) had read the advertisement convening the meeting, Mr. G. HUDSON (the chairman) said the first project was an extension of the North Midland Railway from Sherburn to Doncaster, the object of that being to unite that line with one which had been proposed from Lincoln to Doncaster. This extension would be nineteen miles in length, making the distance from York to Doncaster 32½ miles. The proposed line was to commence at the Milford Junction. He apprehended that this would be the best line that could be selected to Doncaster. It was one that would not interfere with any gentleman's residence at all, and there was no landowner opposed to it. This line, perhaps, was the only one that would be submitted to the meeting that could be called a competing line. The line called the Direct London and York line, it appeared, intended to go to Doncaster, and, of course, which of the two should be selected would be for Parliament to determine. The Direct London and York line was opposed by almost every landowner. He was strongly impressed with the justice of the claim of the North Midland to make the line to Doncaster, and in this he was supported by some of the most eminent engineers of the day. Mr. Locke, the engineer, had given it as his opinion that it would be most desirable, in approaching York, that the London and York line should come on the York and North Midland. It would be seen, therefore, that if the Direct London and York line did not come upon the North Midland, there would be a needless and wasteful interference with the property of the York and North Midland Company, inasmuch as if Parliament granted the London and York scheme, that line would run parallel to the York and North Midland. He thought that if ever any company had a claim upon Parliament, it was the York and North Midland. He was perfectly well aware, in approaching this fight, that the other party had enlisted something of public feeling in their favour. He was aware that those gentlemen who were the guardians of the public property had become parties to this wild speculation—gentlemen to whom had been intrusted the representation of great interests, were the men who were found aiding in wildly and wastefully squandering vested property away. It appeared to him that Members of Parliament—men sent to represent great interests—ought to be very careful in mixing themselves up with contending interests, except where great public good was to be accomplished. In fighting this battle the York and North Midland Company were labouring under disadvantages in which they ought not to have been placed. He was, however, satisfied with the justice of Parliament. He did not think that the question of competing lines had been sufficiently considered with reference to the public. He believed that the public were much more interested in the matter than the proprietors of railways were. If lines were to be made by the York and North Midland Company and the London and York Company, the result would be a violent competition. Farewell the prospect to the public for years to come of any large reduction in the fares; for the public must eventually pay for both lines. A compromise must inevitably ensue, and the fares would then be raised to their maximum point, there to remain. If, on the contrary, the North Midland were allowed to go on with a fair protection to their interests, the effect of that protection would be an increase of traffic, and a corresponding reduction of fares. What was the case now? They found that they could give 10 per cent. dividends, and they immediately advertised a reduction of 20 per cent. in some cases, but an average of 15 per cent. on their fares. If they should have the same dividend the next year—if they should find that with a reduction of fares they could still pay a dividend of 10 per cent., of course a further reduction in the fares would take place. Under these circumstances, he could not doubt that Parliament would recognise their claims. He thought it would be better for Members of Parliament, instead of running about the country like a set of itinerant preachers, to stay at home and consider what they were about. He for one would always protest against those who had been returned to Parliament taking advantage of their position to injure another's property. In leaving this part of the subject he would say, that when the fight came, the North Midland Company would thoroughly beat their opponents. The next line was the line to Harrowgate. There was no opposition to this line. It would give accommodation to Tadcaster, Thorp-arch, Wetherby, and Spofforth. The next line was Goole, and this line would cost 100,000*l.* The one to Bridlington, which would be nineteen miles in length, would cost 80,000*l.* The Whitby and Pickering he had already purchased for 80,000*l.*, the original cost being 150,000*l.* The sum required altogether for these lines was 600,000*l.* There were 130 miles of railway, and the whole would be constructed at about 13,000*l.* per mile. The capital of the company with the new creations was [illegible]. The hon. gentleman concluded by moving resolutions—That it is expedient that this company should undertake the formation of the following lines—a railway from the York and North Midland Railway, commencing in the township of Sherburn, to Doncaster; a railway from the York and North Midland Railway, commencing in the township of Church Fenton to Harrowgate; a railway from the Leeds and Selby Railway, commencing at or near Selby to Goole; a railway from the York and Scarborough Railway, in the township of Seamer, to Bridlington.—The resolutions were passed unanimously, and the directors were empowered to go to Parliament next session for the necessary Acts.—The following resolution was then adopted:—"That in order to raise funds for the purposes aforesaid, an additional capital of 600,000*l.* be raised by the creation of new shares of [illegible] each, and that such shares be offered in the first instance to the proprietors who shall have been registered in the books of the company on the [illegible] day of November next, in the proportion of [illegible], including the Leeds and Selby [illegible] shares; and for every two [illegible] shares, including the Leeds and Selby and York and Scarborough shares of that amount; and that a deposit of [illegible] per share be paid thereon, at the bankers of the company on or before the [illegible] of December next; that provision be made in the Act or Acts for the payment out of the additional capital so required of the rate of [illegible] per cent. per annum to holders of such new shares on the amount of their subscription till the works be completed, after which the new shares to form part of the capital stock of this company."—Thanks were then, amidst much applause, voted to the chairman, and the meeting separated.

[After the meeting, Messrs. [illegible], waited upon Mr. Hudson, as a deputation from the [illegible], respecting the views of the York and North Midland Company with regard to those lines. The deputation was [illegible] received, and Mr. Hudson expressed his readiness to co-operate with the Lincolnshire company in carrying out their object.]

THE FLOATING AND OSCILLATING HYDRAULIC MACHINE OF M. DE CALIGNY.

A report has been made to the Academy of Sciences, by a committee of inquiry, in favour of the invention of M. de Caligny. This has been constructed by him, of such dimensions, at his own cost, as would be sufficient for its operations being carried on at the wet docks of Chaillot (conjointly with M. Count, formerly a pupil of the Central School of Arts and Manufactures, and employed in directing the water of Paris), where several experiments have been made in the manner described in his last paper. The committee then state the nature of the experiments made in their presence, with a view to ascertain the labour produced. This machine, say they, is composed of a large tube, in the form of L, which descends from the level of a reservoir, and then bends horizontally at the bottom of a lower *bief*, as it is called. The water falls in at intervals, and this periodical falling in produces at the level of the liquid, in the vertical branch, oscillations, which a float of a large size transmits to the machine which works them. The flowing of the water is alternately interrupted and maintained by a cylindrical floodgate, barred to a ring or annular float, which floats in the tube. When the oscillating level is near attaining the end of its ascending course, the ring, floats, and the floodgate, open; a portion of the water of the reservoir gets into the tube, and fills it; this water afterwards runs away, its level lowers, and the ring descends with the floodgate, which closes itself. In the machinery established at Chaillot, and by the medium of a rope and two back pullies, the oscillating float rose periodically 1 in 60, a mallet weighing 55 kil. Knowing the height of the fall, the volume of water run off, and the number of blows of the mallet obtained with this medium, it was easy to find the labour obtained; yet, to appreciate more perfectly the effect of this motive power, we should have kept an account of the passive resistance of the additional machinery, such as the *friction* of the pullies, the inertia of the mallet, &c. By neglecting these losses of power, foreign to the hydraulic motive itself, the experiments made under our observation led to 55 per cent. of successful results. We hasten to confess that this result, obtained with an apparatus the construction of which was directed with strict economy, but left much to be desired, ought not to be considered but as a minimum. There is no doubt, if the hydraulic machine of M. de Caligny were employed more advantageously, constructed with more care, and in such fresh proportions as have been pointed out by the last experiments, that the good effects produced would be much more considerable. We must here mention, that M. Coriolis gave a real importance to the invention of M. de Caligny; for, besides the favourable report which he made, this illustrious savant took all opportunities of speaking in its praise, and tried to induce the engineers to adopt this new machine, which facts are substantiated by several letters. After the trial which it has undergone, this oscillating and floating machine does not appear inferior to many of the hydraulic powers now in use, and circumstances may be conceived in which it might be considered as preferable. Finally, the committee recommended an acknowledgment on the part of the Academy that this ingenious machine of M. de Caligny could be employed with advantage, and that thanks be voted to the inventor for his communications on the subject, which were adopted.—*Moniteur Industriel.*

COPPER TRADE WITH INDIA.

Year after year the copper trade with India is becoming of higher and higher national importance; and it would now be difficult to mention any considerable department of British industry which is not materially affected by it. There is a report of imports and exports published annually in Calcutta, which shows the steady progress of this great commerce; but the one for the last official year contains matter of general interest for the part of the United Kingdom in which our Journal circulates. We allude to the great increase which is shown in the consumption of copper in India.

In the years 1835-6, 1836-7, and 1837-8, the importation of this article amounted on an average to the value of 2,375,000 rupees (237,500*l.*), but the last of these years had so heavy a proportion as to cause a glut in the market, which was felt to some extent till 1841, when the average of three years was 2,126,000 rupees, or 212,600*l.* The trade then recovered rapidly, the average of 1841-2 and 1843-4 being 3,243,000 rupees, and the proportion of the latter year amounting to no less than 42 lakhs, or 420,000*l.*

This holds out a cheering prospect in every point of view, for it indicates an improvement in the condition of our Indian customers, with as great certainty as an increase in the customs duties in England exhibits the prosperous condition of the body of the people. The only use to which copper is as yet turned is in manufacturing the domestic utensils of the Hindoos, who no sooner emerge from abject poverty than they hasten to exchange their earthenware for dishes and water-pots of brass. An increase in the demand for copper, therefore, among the natives shows an increase in their home comforts, an amelioration of their social position—a state of things which must be highly gratifying to the philanthropist; while, talking commercially, it opens out prospects for British commerce by no means confined to the article in question.

We need hardly say, that whatever copper is used in India in machinery goes out from this country in a manufactured state, and is included in the report under another item. But this branch of trade may likewise be expected to show speedily an improvement of some importance. By the last accounts from India, an immense increase in the manufacture of sugar, for instance, was confidently expected, the speculators being by no means afraid of the late reduction in the protecting duties; it is thought, indeed, that this very reduction may operate advantageously, by forcing the capitalists out of their present clumsy and expensive process, and introducing a cheaper and more scientific mode, which will enable them to take the lead of foreign nations in the British market.

We are aware that our view of the question is liable to dispute, and that the increase in the copper trade may be set down by some persons, as the result of mere temporary speculation; but various circumstances incline us to a different opinion. The very same increase has taken place in the comparatively small traffic carried on with America in the article. In 1839-40, the imports were in value 20,100 rupees; in 1840-1, 68,000 rupees; and in 1841-2, 192,800 rupees. But it is on the general report of Indian business we place reliance, which exhibits a steady improvement for the last eight or nine years, during which the importation of our goods has nearly doubled. In 1843-4, both imports and exports were so great as to be without precedent in the commercial connexion of the two countries—the former amounting to 6,476,000*l.*, and the latter to 10,117,000*l.*—*Bombay Journal.*

COMPRESSED AIR SPRINGS FOR LOCOMOTIVES.—Air springs, the principle of the construction of which is based on the compressible nature of air, are not entirely new. In 1839, Mr. Burstall took out a patent for applying the same principle to the stops or buffers of railway waggons, and more recently Messrs. Stephenson, Bowman, Mallet, Church, [illegible], &c., have taken out patents for substituting air in some shape for the elasticity of steel springs. A new solution of this principle is, however, now due to Mr. L. [illegible], of New Jersey, in the United States, which appears at once simple and efficacious, and, from its various applications, seems to have been of great service. These air springs of Mr. [illegible] consist of a cylinder shut at both ends, and inclose the compressed air, which is acted upon by a piston. The air is introduced at a convenient pressure by means of a forcing pump, through an opening in the top of the piston, which is shut by a valve opening from the out to the inside; this piston is of a massive nature, and is of cast-iron; it has a branch, which at the bottom works into a box of wadding, and rests in a plate on the side of the vehicle. The upper side of the piston is furnished with a coat of leather very nicely adapted to the cylinder, and is applied against its side at a height of about five centimetres. This leather is attached to the body of the piston by an iron plate, with a screw; the round space above is filled with white lead, on which is placed a thick coat of oil, so as to render the piston impermeable to the air. The weight to be carried is placed upon the middle of the lid at top of the cylinder. Springs of this description have been applied to waggons on the railway between Philadelphia and New York during a year to the satisfaction of the directors, as well as the public. It was feared at first that it would not be possible to preserve the air in the cylinder at such an enormous pressure, which was from 10 to 20 kil. per square centimetre, but experience has proved the contrary, and these springs have, notwithstanding their daily use, preserved the air perfectly during the space of more than five months, without any view of being [illegible].—*Moniteur Industriel.*

TO MAKE [illegible] IMPERMEABLE TO GAS.—M. [illegible] has shown that linseed oil placed on the external surface of the [illegible] renders it impermeable to gas.